

# THE WORLD WE LIVE IN



WEINBERG • SCOTT • HOLSTON





Class H 95

Book W 4

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This Map Shows the Route of the World Fliers That You Will Read About in Chapters 1 and 2.



# The World We Live In

## *An Introduction to the Social Studies for the Intermediate Grades*

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### *Foreword to the Teacher*

FOR some years there has been a definite demand from teachers of the fourth and fifth grades for a book that would serve as an adequate introduction to geography. *The World We Live In* has been planned to fill this need. It has been planned, furthermore, with the conviction that an *introductory study of geography* takes on added meaning when the history of man's control of the geographic environment and the civic aspects of man's coöperation in the control of nature are fused with geography.

A study of the table of contents will reveal the outline of this plan and will show how the authors have met the problem of correlating geography, history, and civics in such a manner as to give to this book the character of an *elementary introduction to the social studies*.

However divided educators may be in their opinions as to the desirability or practicability of merging history, geography, and civics in the junior-high-school grades, there can be no difference of opinion as to the absolute necessity of presenting to the younger pupils of the intermediate grades an introductory and integrated picture of the world in which they live, through which they can learn (1) to appreciate the earth as man's home, (2) to understand man's life on earth as a progressive experience in the control of nature, and (3) to become familiar with man's ways of living and working together as a progressive growth in the art of human coöperation.

Each chapter in this book, even when it deals with apparently new material, is built around a core of pupil experience. The

teacher can make special application of the chapter content to the pupil's own environment and thus make the book function as a study of *home geography* as well as of local community life and local history. Of course, in the very nature of things, not all that is peculiarly local in pupil experience can be introduced into a text; on the contrary, the application of textual material to the further organization and interpretation of the immediate environmental experiences of children must remain the most interesting and most fruitful contribution of the intelligent teacher.

Teachers interested in the development of constructive imagination, in the creative aspects of teaching, will find particularly useful the illustrations, which have been especially prepared as visualizations of the facts and principles set forth in this text. There are teaching values in line drawings, when intelligently designed as teaching instruments, which photographs, as such, cannot possibly match. Certain of the illustrations, such as "The Eskimo Summer Tent," "Eskimo Tools," "American Indians Gathering Rice," and "Plains Indian Tepee," are drawn directly from models in the American Museum of Natural History. The picture of the Pueblo Indian houses is from a model in the Museum of the American Indian. Such illustrations make possible the classroom study of valuable museum material; they bring the museum, in part, into the classroom. All the pictures set basic functioning concepts before the pupil in the form of concrete visual images. Many of them, especially those of a diagrammatic, cartoon nature, organize for the pupil a mass of related concepts. A considerable number of the pictures can be discussed in the class for their geographic implications, their evidence of man's control of nature, and their testimony as to man's coöperation in the control of nature. From the point of view of creative learning,



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pupils can be encouraged themselves to create additional visualizations of the text; the pictures in the book then serve to provide either the raw material or the models for such visualizations (as in the case of the diagrammatic cartoons).

The contents and organization of this book were felt to be sufficiently novel from the point of view of use in the intermediate grades as to warrant careful classroom trial before publication. Accordingly, several hundred copies of an experimental edition were printed and, through the professional coöperation of the administrators concerned, were tried for several months in the classrooms at Asbury Park, Bridgeton, and Westfield, New Jersey; Gloversville and Newburg (Mt. St. Mary-on-the-Hudson), New York; Brockton, Lynn, Salem (State Normal School), Wellesley Hills, and Winchester, Massachusetts; Bay City, Michigan; East St. Louis, Illinois; Providence, R. I.; and Burlington, Vermont. The authors acknowledge a debt of gratitude to the more than forty superintendents, supervisors, principals, and classroom teachers who thoroughly tested the experimental edition, and who contributed in their reports of the experiment excellent constructive criticisms.

In addition, the authors acknowledge valuable criticisms, based upon personal examination of the experimental edition, that were received from experts from Los Angeles, California; North Grosvenordale, Connecticut; and from members of the State Department of Education, Albany, New York, who were directly interested in introductory texts in geography.

In the preparation of this book for final publication careful consideration has been given to every suggestion received from all the sources just mentioned.

It is the hope of the authors that teachers and pupils will find both pleasure and profit from their joint work in the use of this book.

THE AUTHORS





*A Word from the Authors to the Children Who  
Are Reading The World We Live In*

We are living in a wonderful world.

Through the ages, men have been struggling to make this world of ours an easier and pleasanter place in which to live.

Man once lived on wild plants for food. He had no fire and no utensils with which to cook. There were many wild animals that were his enemies, and he had no weapons. His clothing was made of the skins of animals, for he had no tools and no skill with which to make clothes. At night he lived in darkness, for there was no light.

But in this world there were many natural resources, and man had a brain and a pair of hands. With his inventive mind he has been able to accomplish all that you will read about in this book. You will understand, as you read, how men and women working together have used the resources of nature to change the world into the kind of place you boys and girls are living in today.

This story of man's struggle, of his successes and failures, is called *history*. The story of the natural conditions that man finds in the world, the obstacles and resources affecting his struggles, is called *geography*. The story of how men have learned to live and work together is often spoken of by your older brothers and sisters as *civics*.

You will find all three stories in this book, and you can appreciate how geography, history, and civics are all parts of the same story if you will read the book carefully and talk about it with your teacher and your classmates.

THE AUTHORS



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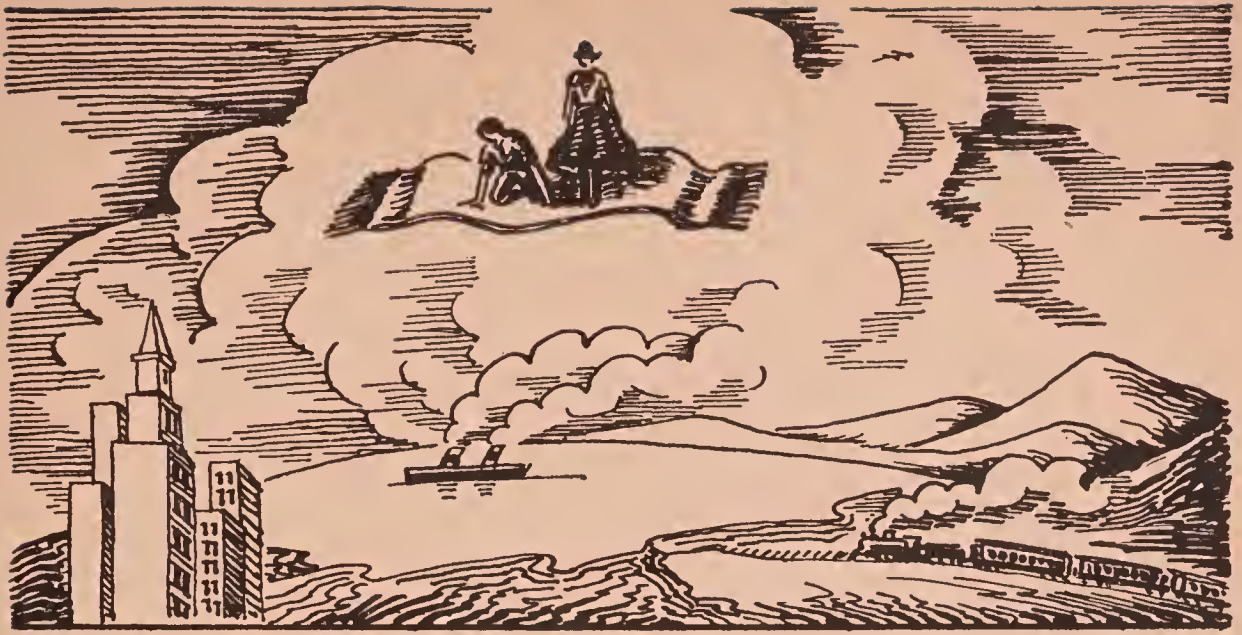
## PART I

### *A BIRD'S-EYE VIEW OF THE WORLD*

#### CHAPTER

1. Around the World by Airplane
2. The Path of the Fliers





## *Chapter 1*

### AROUND THE WORLD BY AIRPLANE

Long ago some one wrote a story about a magic carpet that could fly through the air and carry people to any place in the world. Since that time, many boys and girls have wished that the story were true and that they, too, could see the world from a magic carpet.

Today the story of the magic carpet has come true. Men do go flying through the air. They fly, not on make-believe magic carpets, but in airplanes.

One day in May, in the year 1924, eight Americans in four airplanes set out to fly all the way around the world. Less than six months later, after many adventures, two of the planes completed the trip.

In their journey the airplanes flew over many lands and many waters. There were stormy days when the men flew through rain, fog, sleet, and snow that sometimes made it



impossible for them to see the earth below them; but there were clear days, too, when they could see for miles and miles in all directions.

### Looking Down on Lands and Waters

Looking down from their planes, the fliers saw a goodly portion of the world in which we live, with its oceans and mountains, its rivers and valleys and plains, its farms, pastures, villages, towns, and cities.

For part of their trip the airplanes flew over oceans where waves rolled on and on for thousands of miles. Every now and then the fliers could see a sailboat or a steamboat pushing its way through the waters.

Whenever the planes were flying over an ocean, the airmen were eager to reach their next landing place as quickly as possible. Oceans are dangerous for airplanes.

To make the ocean flights less dangerous, the planes were built so that they would float in case of accidents over the sea. As things turned out, this was a wise precaution. One of the planes, finding itself in trouble, did have to drop into the ocean. It floated for four hours before passing ships came to the rescue. The men were saved, but the pounding waves destroyed the plane.

In flying over land, the airmen found the crossing of the wild mountain country the most dangerous part of their task.

As they came near the mountain country, the men first saw low hills rising a few hundred feet or more from the

earth. Then behind the hills they saw mountains rising thousands of feet into the air. To the fliers these mountains were like walls blocking their path.

As the planes rose to fly over the mountains, the men could see dark forests growing on the mountain sides. Looking down on the tops of the higher mountains, they could see



Plains

Hills

Mountains

snow and ice. On those frozen peaks, neither plants nor animals can live. An accident while flying over the mountains might prove at least as dangerous as engine trouble over an ocean.

One day while flying through clouds and mist, one of the planes struck a mountain side and was destroyed. What happened to the men we shall read in a later chapter.

There were times when the men flew for hours over plains where the earth is level for hundreds of miles. Looking through their field glasses, they could see that these plains





Looking Down on Lands and Waters

are not all alike. Some of these plains are farming lands; some are pasture lands; and some are plains without moisture and are called *deserts*.



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Looking down on the farming lands, the fliers saw growing crops of grain, fruits, and vegetables. On the pasture lands the fliers saw cattle and sheep grazing on the wild grass. On the deserts the fliers saw few plants growing and no animals grazing.

In the course of their flight the fliers looked down on many a valley where the earth seemed like a great basin between hills and mountains. Rivers flow in these valleys. Branch rivers flow into the great rivers. These branch rivers are formed from the rain and snow that fall on the hills and mountains.

Some of the river valleys were busy places. Back from the banks of the rivers, the fliers could see farmhouses and the fields in which the farmers raise their crops. Along the river banks they could see small villages where a few hundred people live in houses built close together. They could see towns where a few thousand people dwell. Here and there in these valleys the fliers looked down on cities where many thousands of persons make their homes. From above, the city buildings appeared like tall blocks set in rows.

Not all the cities were in river valleys. The airmen saw cities built on the shores of large bodies of inland water. These bodies of water look like oceans, but they are smaller and are called *lakes*. The men saw cities rising straight up above riverless, treeless plains. Even in the heart of wild mountain country they occasionally saw a city.

### Home Again

When the fliers, coming home from their long trip, saw the cities of their own United States again, they were happy. When they landed, they were hailed with joy. The people were proud of the fliers and were glad to welcome them home again.

### Things to Do

1. Tell what the fliers saw as they looked down from their planes.
2. Draw colored illustrations of the story.

### Find the Best Answer

1. Eight Americans in four airplanes set out to fly all the way around the world
  - (a) in May, 1930
  - (b) in May, 1924
  - (c) in May, 1920
2. Airmen
  - (a) enjoy flying over the ocean
  - (b) think the ocean dangerous
3. On the tops of the high mountains they saw
  - (a) dark forests
  - (b) snow and ice
  - (c) plants and animals
4. Plains are
  - (a) level land
  - (b) hilly country
  - (c) long mountain slopes

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5. Looking down on the desert, the fliers saw

- (a) crops of vegetables
- (b) animals grazing
- (c) few plants growing

## *Chapter 2*

### **THE PATH OF THE FLIERS**

In their trip around the world the fliers journeyed 27,534 miles. The flight took them 5 months and 22 days. But the real flying time was only 351 hours and 11 minutes, or 14 days, 15 hours, and 11 minutes.

The airmen flew by day. At night they landed to rest. Often on account of poor weather conditions or engine trouble they had to stay where they landed for a day, a week, or even longer. Then, when they were ready, they rose into the air and flew on.

#### **The Flight Begins in Seattle**

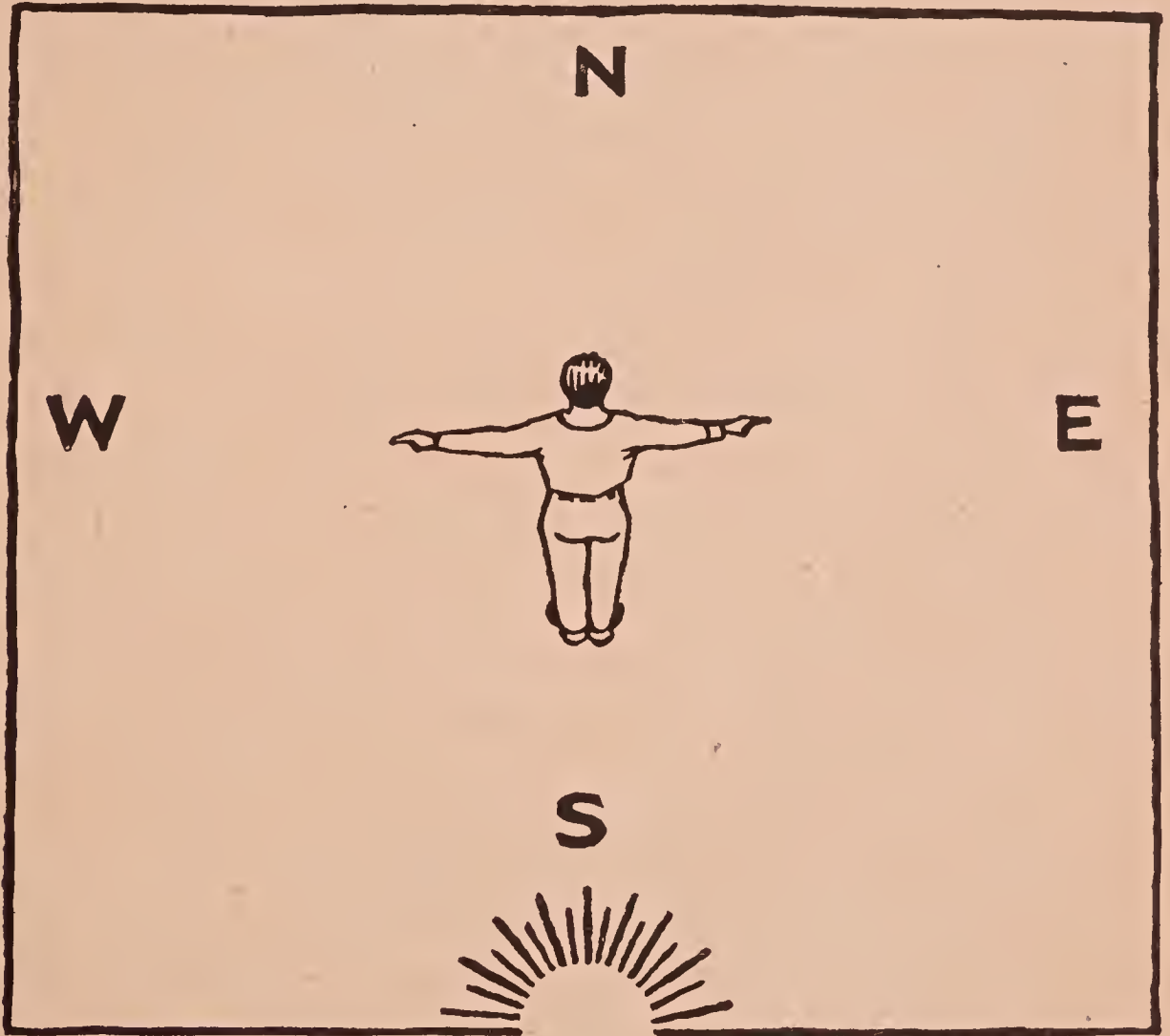
The men started from the city of Seattle on the Pacific coast of the United States.

They first flew north. If you wish to know which way is north, stand at noon with your back to the sun. Stretch your arms out sidewise. The south will be behind you, your right arm will be pointing to the east, your left arm to the west, and you will be facing the north.

The fliers had an easier way of knowing direction. Wherever they were and at any time of night or day, they could tell north, south, east, and west by looking at a compass. A compass has a needle that points toward the north. North, south, east, and west are all marked on the compass.



The fliers were also guided by maps, or drawings of the earth, which showed them the shapes of the different lands and waters of the world. Their maps showed them where each place is; whether it is north or south or east or west of



some other place. Have you ever taken a long ride in an automobile to some place where you have never been before? Do you remember your father taking a map out of his pocket to find which way to go?

Looking at their maps, these fliers saw that Alaska, the first place that they wished to reach, lies toward the north. Then they looked at their compasses and flew northward.

The fliers left Seattle in May, when it was almost summer there. When they reached Alaska a few days later, they found the weather cold. There are parts of Alaska where it is cold almost all the year round.

The fliers found sudden changes in weather many times during their journey. Whenever they flew far into the north countries, they found the climate cold. When they flew south again, they found the climate warmer. But we are getting ahead of our story.

### Across the Pacific Ocean

Leaving Alaska, the fleet of airplanes turned westward to cross the Pacific Ocean. It was here, only a short distance from the mainland, that one of the planes was wrecked by flying against a mountain side. This happened on one of the Aleutian Islands, off the coast of Alaska. The three remaining planes continued on their westward flight.

The wind over the Pacific was fierce and chill, and the fliers were glad when they came to islands in the ocean upon which they could land and find shelter. On one of the islands of Japan, school children celebrated the landing of the fliers by singing songs to them from a hillside. Journeying on beyond Japan, the men reached the mainland of the great continent called Asia.

### Over Asia and Europe

To cross Asia, the airmen flew southward over China, the home of the Chinese. They flew over India, the home of the

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Hindus. They flew over Persia, Arabia, and Turkey. They stopped for a while in each of these countries.

In India, which is much farther south than Alaska, the men found the sun hot, and they feared that the terrific heat might damage their engines. The planes therefore carried as little load as possible, so that the overheated engines need not work too hard. Even so, one motor did give out, and the men had to get a new one to carry them on.

About the middle of July the fliers reached the continent of Europe, where they flew over Austria, France, England, and Scotland.

Leaving Scotland, they undertook to cross the Atlantic Ocean in three hops. Their first hop was to carry them to the island of Iceland. Their second hop was to land them on the island of Greenland. Their third hop was to bring them to America.

In these northern islands winters are long and cold, just as they are in northern Alaska. Floating about in the ocean near Iceland and Greenland, there are ice floes and icebergs. An ice floe is a sheet of floating ice made of sea water. An iceberg is a floating mountain of ice that has broken away from a glacier. A glacier is a body of ice made in a region where there is snow all the time. Some icebergs are thousands of feet long and hundreds of feet high.

In the first chapter we read how one of the planes dropped into the ocean and was wrecked. This happened on the way to Iceland.



When the two remaining planes were flying from Iceland to Greenland, there was a heavy fog over the ocean, and the planes, which had to fly low, were in danger of crashing into icebergs. Fortunately there was no such accident. The two planes reached Greenland safely.

### Back to America

From Greenland the fliers made their third hop across the Atlantic Ocean, this time reaching Canada on the continent of North America. Now the planes were near home.

From Canada the fliers turned their planes southward to the city of Boston on the Atlantic coast of the United States. From Boston they flew still farther south, landing first in New York City and then in the city of Washington in the District of Columbia. Here the President of the United States and other great men of the nation came out to the landing field to greet the world fliers as they arrived.

From the city of Washington the planes flew across the United States. They stopped at many cities along the way, and at last they reached Seattle, the city from which they had started.

So the fliers completed their journey. It was the first time that men had succeeded in flying around the world.

Since this first round-the-world flight, other aircraft have flown around the world. The latest flying machines have grown so much safer that today they are used in ordinary traveling. It may well be that many of you who read this



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book will some day see much of this earth of ours from airplanes.

In Chapter 24 you will read more about the airships, dirigibles, and airports of today.

### Things to Do

1. Find Seattle on the map.
2. Find Alaska on the map of North America.
3. Find it on the map of the world.
4. Find it on your globe.
5. Find the route of these airmen from Alaska to Asia. Find Japan, India, Turkey, Persia, and Arabia on the map of the world.
6. Find Austria, France, England, and Scotland.
7. Find on the map of the world the route of the fliers from Scotland to Canada; find the places where they stopped before reaching Canada.
8. Describe the flight from Seattle to Greenland.
9. Describe the flight from Greenland to Seattle.
10. Now perhaps you can follow the entire journey of these airmen, finding on your map all the places over which they flew.
11. In this chapter you must have learned many new words and phrases. Tell the meaning of each of these words and phrases; see whether you can use them in sentences:

accident

grazing

mountain

iceberg

Eskimo

river

compass

ocean

lake

field glass

island

desert

Find the Best Answer

1. The fliers journeyed
  - (a) 8,000 miles
  - (b) 27,534 miles
  - (c) 52,700 miles
2. The flight took them
  - (a) 5 days
  - (b) 5 months
  - (c) 5 years
3. The airmen flew
  - (a) by day
  - (b) by night
  - (c) all the time
4. The fliers started from
  - (a) New York
  - (b) Seattle
  - (c) Washington, D. C.
5. If you stand at noon with your back to the sun, north will be
  - (a) behind you
  - (b) in front of you
  - (c) at your right
  - (d) at your left

## PART II

### *WORKING TOGETHER: PAST AND PRESENT*

#### CHAPTER

3. Why the World Works
4. The Earth as a Storehouse
5. The Earth as a Workshop
6. When the Whole World Was a Wilderness
7. How Man Conquered the Wilderness
8. The Nations of the Earth





## *Chapter 3*

### **WHY THE WORLD WORKS**

You read in the last chapter of a famous flight around the world. You remember that the airmen passed over farms where farmers were busy raising foods. They saw grassy plains where cattle and sheep were grazing. They passed over cities where factories with smoking chimneys were busy making many things. They passed over rivers and oceans where boats were carrying people and cargoes of goods to many parts of the world.

All the world was busy working.

#### **What Are Our Needs**

At all times, all over the world, people work. On farming lands farmers are busy in their fields. On pasture lands men are raising sheep and cattle. In forests on the sides of mountains men are cutting down trees or hunting wild animals. In city mills and factories men are making things. In city stores and offices they are busy buying and selling. Men are working on trains that cross the lands. On ships at sea, on airplanes high up in the air, even in mines under the earth, men are working. All over the world women are working, too. In homes and schools, on farms, in stores and factories and offices, women work.

Why must men and women work? Of course, we know that people must make a living. But what are the things that people need so that they can live?

We should soon learn what our real needs are if we found ourselves wrecked in a wilderness as two of the fliers were. You remember that one of the planes was destroyed by striking against a mountain on a desolate island near Alaska. For the fliers to have stayed where their plane was wrecked would have meant certain death; so they set out in search of help.

### **The Needs of the Wrecked Airmen**

As the men pushed through the lonely wilderness, what did they need? They needed food. Food satisfied their hunger and kept up their strength. So each day they ate a little of their small supply and wondered what they should do if they did not find help before the last of their food was gone.

The fliers needed clothing. Their warm clothing protected them from cold and snow.

The fliers needed shelter. At the end of each day they had to seek a place where they could sleep protected from bad weather and wild animals.

Food, clothes, shelter — these three things the fliers needed. But these were not all their needs. To obtain food, clothes, and shelter, they needed other things.

The airmen needed some means of transportation, or, in other words, some way of carrying things from place to place. As long as their backs would bear up under their

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loads, their own bodies were a means of transportation. But if these fliers had had a dog team and a sled, they could have covered ground more swiftly.

The fliers needed some means of communication, or, in other words, some way of sending messages. When people in the same room talk to one another, they are communicating, or sending messages, but the messages travel only a few feet. There are times when we need to send messages for many miles. The airmen knew that if only they could let people know what had happened, a rescue party would be sent to their aid.

Meanwhile, the people of the United States were reading the papers anxiously and wondering what fate had befallen the two airmen. A week passed, then the eighth day, the ninth day, and still no word. Every one feared that the men had died.

But on the tenth day the men reached a United States fort where there was a radio station from which they sent word that they were safe.

### Our Five Great Needs

The adventures of the wrecked airmen proved that they needed food, clothes, shelter, ways of carrying things, and ways of sending messages.

But were they the only persons who needed these things? No. You need them. All people have these needs, and that is why, all the world over, people are working.



### How Men Work to Satisfy Our Needs

Farmers and herdsman must work to get us food. Lumbermen in the forests must work to get wood for the buildings that shelter us. Workers on trains and ships must carry food from the farms to feed the people in the cities. They



must carry clothes from factories in the cities to supply the people on the farms and in the forests. Telephone operators, telegraph operators, wireless operators, must help in sending messages that go back and forth between city factories and farms. Men in the post offices are busy gathering and sending letters. Miners deep down in mines must dig out ores that are used in making tools for all the other workers. In other mines men are digging coal to be used to heat our houses and to run machinery in factories.

But what of ministers and priests, teachers, doctors,



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lawyers, scientists, and other men of learning? What of musicians; people who write stories, poems, and plays; people who paint pictures and make statues? What of baseball players, football players, tennis players, and other athletes?

All these men and women work. Do we say that their work is not needed? No. Men of learning are all workers who may use their learning to help other workers.

Poets, people who paint pictures or write plays, all men and women who work in the arts may help other workers by entertaining them in their hours of rest.

The spirit of sport and athletic play helps to keep people in good cheer.

Now if we think of all the work in which our own friends and relatives are engaged, we can see how many of them are busy trying to supply one or another of our needs.

### Things to Do

1. Make a list of all the kinds of work mentioned in Chapter 3.

2. Mark on a map of the United States the places where some of these kinds of work are being done.

3. Did you get the idea that men and women are doing about the same kinds of work the world over? Tell your class what you know about this.

4. In the list of words below are some that you may not have known before. Tell your class what you think these words mean.

transportation  
wilderness

desolate  
communication

miners  
adventures

## 24 WORKING TOGETHER: PAST AND PRESENT

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If you do not remember the meanings of these words, read the chapter again and see if you cannot find their meanings from your reading. Perhaps your classmates or your teacher will help you.

5. Tell what the five great needs of man are. Tell how men are working to satisfy these needs.

## Chapter 4

### THE EARTH AS A STOREHOUSE

If we trace back any of the things that workers have made for us, we find that the earth is the storehouse from which we get the things we need.

Let us begin by tracing back the coats we wear. We find that they were bought in the clothing store. The storekeeper bought them from a clothing factory. The factory owner made the coats from woolen cloth that he bought from a woolen mill. The owner of the woolen mill made the cloth from wool that he bought from a herdsman. The herdsman got the wool from his sheep. The sheep grew his wool because he was well fed. The sheep fed on grass, which is a plant growing from the earth.

The dishes from which we eat were bought in a store. The storekeeper bought them from a pottery, where they were made from a kind of soil called *clay*. The clay the potter used was taken from beds of finely powdered rock in the earth. Have you ever noticed the earthy smell of wet clay?

So we see that the earth has provided us with our coats and our dishes. If we trace back anything else, whether it be an article of food, clothing, or shelter, a means of transportation or of communication, or a tool of any sort, we

shall find that the materials from which it is made come from the earth.

If we think of the earth on which we live as a storehouse, we find that in this storehouse there are three kinds of things: plants, animals, and non-living things called *minerals*. Let us think of these three kinds of things as three departments in nature's storehouse: the mineral department, the plant department, and the animal department. Now, one by one, we shall enter into these three departments to see how we obtain from them the things that we need.

### The Mineral Department

The mineral department is a most important department.

By far the greater part of the earth is made up of minerals. The air above the earth, the waters that flow on the surface of the earth, the soil beneath our feet, the rocks, metals, oils, and gas under the soil, are all made of mineral materials.

Let us see some of the ways in which the mineral department supplies man with the material for his food, clothing, shelter, transportation, and communication.

Without the minerals that come in the form of air and water, neither plants nor animals can live. Plants and animals must have air to breathe and water to drink. In some foods, such as apples, tomatoes, and grapes, there is iron. In milk there is calcium. Iron and calcium are two of the minerals that the body needs as part of its food. Thus the mineral department helps to feed man. One of the most important minerals that man needs in his food is salt.



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Later we shall read how workers obtain the salt that we use as part of our food.

Now let us see whether minerals supply material for making clothing. At first it may seem that this is impossible. We do not wear air or water or rock. But the knights of old did wear suits of iron, and during the recent World War soldiers wore metal helmets. These suits of iron are called *armor*. Armor is clothing worn in battle to protect the body. Iron and other metals are, of course, minerals. Should you be surprised if you learned that there are minerals even in the clothes you are wearing? There are. The dyes that were used to put the colors into your clothes were made from minerals.

Next let us consider shelter. Do the workers who build our homes and other buildings use minerals? Have you ever seen a stone house; iron, brass, or copper pipes; iron nails, glass windows, concrete foundations, bricks, cement? Stone, iron, brass, copper, glass, concrete, cement, and most bricks are mineral materials. Take these things out of your school building, and how much of the building have you left?

The iron and copper in your school building are metals that workers obtain from mines. The bricks were made from clay and sand. Glass is made from sand. Cement is made by grinding different kinds of stone to a fine powder; concrete is made by mixing sand, cement, crushed stone, and water. In later chapters we shall learn more about these building materials and how workers obtain them from the earth.

Before leaving the subject of shelter, we might think of a few other minerals used to give us comfort in our homes. The coal, gas, and oil that heat our homes or cook our food are also minerals that workers obtain for us from the earth.

Clearly, the mineral department in the great storehouse of the earth helps to supply us with food, clothes, and shelter. Likewise, minerals help man in the matter of transportation. You can list for yourselves some of the minerals used in making wagons, automobiles, ships, airplanes, and other vehicles that aid us in transportation. You can readily remember that the coal in the railroad locomotive, the gasoline in the automobile and airplane motor, are minerals.

How about the use of minerals in communication? Remove the copper wires from our telephones and radios and see what happens. Clearly, one mineral at least is most important in communication.






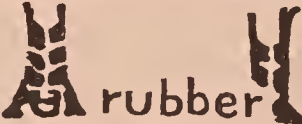










### **The Plant Department**

If we now turn from the mineral to the plant department, we shall find that man uses the plants in nature's storehouse for much of his food, for making clothes, and for building places of shelter. We shall find that man uses materials obtained from plants to aid him even in transportation and communication.

As for food, you, yourself, can list at least ten plant foods, including in your list various kinds of fruits, vegetables, and grains, such as apples, cabbages, and wheat.

In the case of clothes you may not be able to list all the

clothing materials that man gets from the plant department in nature's storehouse. Let us therefore remind you that your straw hat, your rubber boots, your linen handkerchief, the cotton in your stockings, were obtained from

HOW MAN USES PLANTS FOR HIS NEEDS			
FOOD	fruits 	vegetables 	cereals 
CLOTHES	 cotton	 flax	 rubber
SHELTER	 wood	reeds 	grass 
TRANSPORTATION	 wood	linen sails 	from flax
COMMUNICATION	 wooden poles	This paper is made from wood pulp 	
TOOLS	Wood 	 straw	 wood

plants. In Chapter 20 you will read how man learned to use these plant materials in making clothing.

"Very well," you may say, "but how about shelter?" We have just mentioned all the minerals in the home. Are plant materials also used in building? Surely. Wood is still one of the most common building materials, and wood comes from trees, which are certainly plants.

So, too, plants help man in transportation and communi-



cation. There is wood in wagons, buses, railroad cars, ships, and other means of transportation. If we regard books and writing as a means of communication between people, we discover that here, too, plants are used. The ink with which these words were printed was made of carbon and other minerals; the type and printing presses used in printing this book were made of steel and iron; but this paper page was made partly from wood pulp, which is a plant material.

By this time you see that we can make a game of searching for ways in which the different departments help to supply man with his needs.

### **The Animal Department**

Let us see how man uses animals to supply his needs.














Again we shall begin with food. Here, clearly enough, animals play a leading part. There are some people who eat only plant foods, but many people the world over eat meat and fish. They drink the milk of the cow and the goat, and eat butter and cheese, which are dairy products, or products made from milk. They eat chickens, ducks, geese, and turkeys, and hens' eggs as well.

You could easily have given most of this list of foods yourselves, but can you list all the ways in which animals help to clothe us? Did you know that your leather shoes, your mother's fur coat, your woolen sweater, your silk tie, were all made from materials obtained from the animal department? In Chapters 18 and 19 you will read about furs,



leather, wool, and silk, and how animals play their part in clothing the world.

When we come to shelter, it may seem difficult to go on with the game. But don't give up. You can think of ways in which animals are used to help build homes for people. If you can't, look at the picture chart on this page. It will

HOW MAN USES ANIMALS FOR HIS NEEDS	
FOOD	 milk  cream  BUTTER  CHEESE  meat
CLOTHES	 silk  leather  wool
SHELTER	 Indian tent  animal skins  Eskimo tent
TRANSPORTATION	 horse  camel  elephant

remind you. In the picture on the row labeled "Shelter," you will see an Indian tepee and an Eskimo summer tent. These tents were made of animal skins; so it becomes clear that some people did turn to the animal department in the earth's storehouse to find material with which to build their homes.

Next we come to transportation. Do animals help us in transportation? That's an easy question to answer. You can name at least four animals that are used to carry people

and goods from place to place: the camel, the elephant, the horse, the donkey.

The next question is difficult. Does the animal department furnish materials that aid man in sending messages? Until recently many people used quill pens in writing. A quill is a long, sharp feather of a bird's wing. Many savage tribes use drums, like tom-toms, for signaling; the heads of the drums are made of animal skins. Glue is an animal material; it is made of hoofs and other scraps of meat or fish. There is glue in the binding of this book, and the book is one of the greatest means of communication ever invented.

Speaking of books, did you know that before people learned to print books on paper, they wrote books by hand on parchment? The parchment was made from a material furnished by the animal department. Parchment is prepared sheepskin. Parchment is still used. Some day if you go to college, you will receive a diploma announcing that you have completed your course. Diplomas are usually made of parchment. When you receive it, let it remind you that in one more way the earth, which is the storehouse of our needs, is serving you.

### Things to Do

1. Either draw or cut out of a newspaper or magazine a picture of an automobile. Show by arrows and printed lettering which parts of the car came from the animal department, which from the plant department, and which from the mineral department.
2. See whether you can trace back to the different depart-

ments in the storehouse of the earth all the materials in this book, including the book linen used in the cover, the glue used in binding the paper, the ink, the metal plates from which the illustrations were made.

3. Make a chart divided into three columns as follows:

BUILDING MATERIALS

Mineral	Animal	Plant

Then write in each column the names of building materials that come from that department.

4. Play a game to be called “The Earth’s Storehouse.” Divide the class into three groups. The first group conducts the mineral department; the second group, the plant department; the third group, the animal department. We feel sure that with this hint you can work out a game that will make clear how each department in the earth’s storehouse supplies people with things that they need. You can, if you wish, have the teacher play in the game. The teacher could say, “I need food.” Then some one in each department could offer food. The teacher could say, “I need clothes.” Then some one in each department could offer a material that would make clothes, and so on.

Find the Best Answer

- 1. The real reason people work is
  - (a) to keep busy
  - (b) to make money
  - (c) to supply their needs



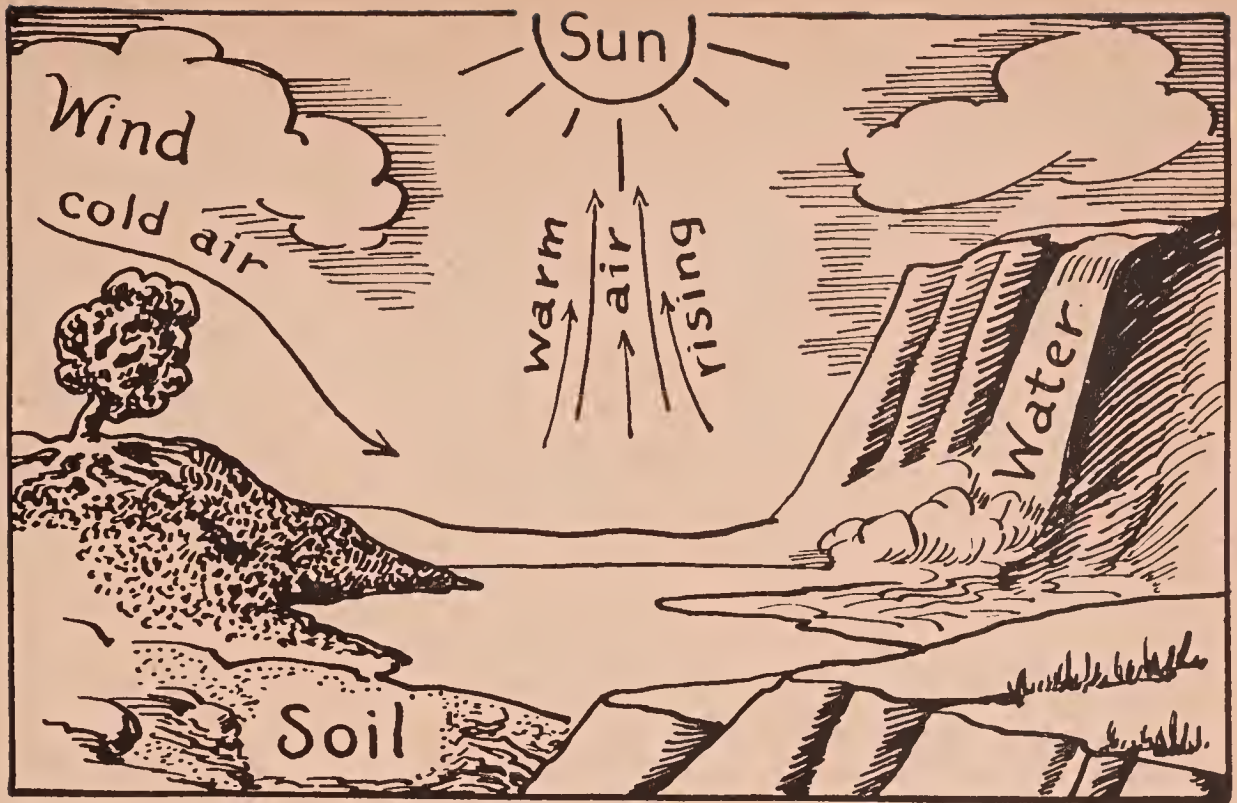
2. Our big storehouse is

- (a) the farm
- (b) the earth
- (c) the mine

3. Our needs are supplied from

- (a) the mineral department
- (b) the plant department
- (c) the animal department, the mineral department,  
and the plant department





## *Chapter 5*

### THE EARTH AS A WORKSHOP

When we step into a department store, we may look at it as either one of two things. We may see it as a storehouse from which people buy the things they need, or we may see it as a workplace in which salespeople, section managers, shipping clerks, window dressers, and other workers are all busy at their various tasks.

We may, if we choose, look at the earth in either one of these two ways. We have just read about the earth as a storehouse, with its various departments, each helping to supply our needs. In this chapter we shall consider the earth as a workshop in which forces of nature are at work.

The three forces of nature that we shall consider in this chapter are heat, wind, and water.

In our chapter on “Why the World Works” we found that all over the world people are working, and that they are working to supply us with the things we need. Now we shall see how all over the world the forces of nature are also at work.

### Heat and the Sun

The first force of nature that we shall consider is heat that comes to the earth from the sun. This heat from the burning sun is constantly doing things in nature’s workshop.

The sun’s heat is at work in all living things. Whether they are plants, animals, or human beings, all living things are factories run by the heat of the sun.

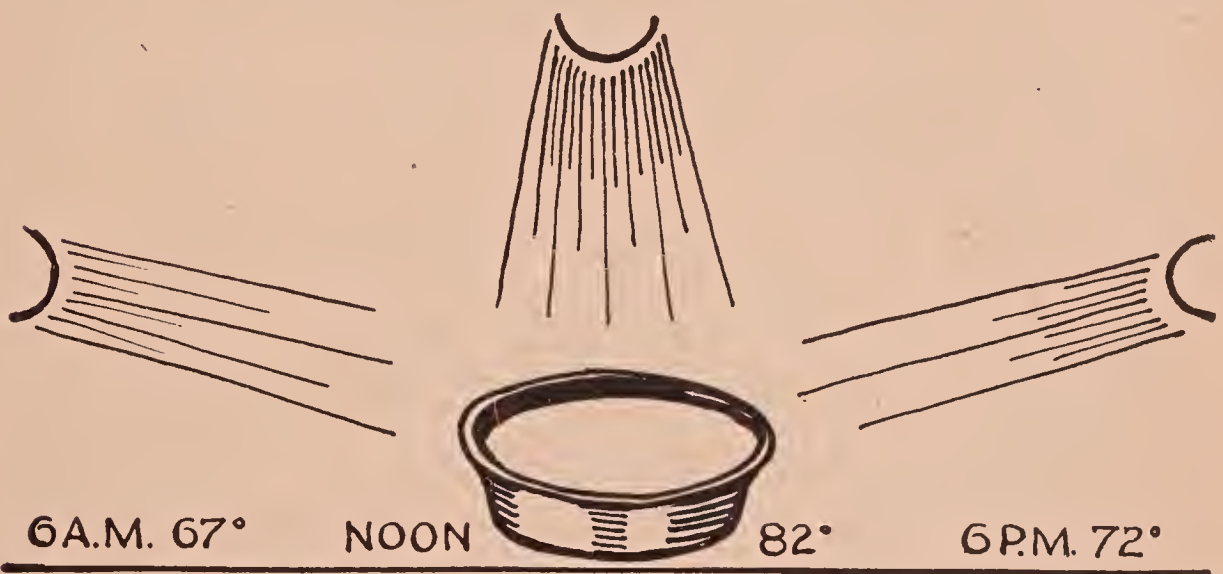
Look at a growing plant. Does it look like a factory? Hardly. Yet we might call a plant a factory. Its leaves, its roots, its stems, are all busy working to change air, water, and the mineral materials of the earth into plant materials.

Plant a bean in a pot of good soil; place the pot in a sunny place; water it daily, and in a few days the seed will sprout. Soon roots, stem, and leaves will appear. In a few weeks beans will grow on the plant. During those weeks work was going on inside the plant, just as work goes on inside a factory. The plant manufactured beans.

Plant a second bean in a pot of good soil, and place the pot in a cold, dark place. Water it daily. Watch it for weeks. The bean may sprout, but the plant will not grow much. No beans will be manufactured. Why? Because the plant factory needed the heat of the sun to help it in its work.

All living things need heat, which comes from the sun. Without the heat from the sun, the work that is going on in all living things would stop; plants, animals, and human beings would die.

Our experiment with the beans has shown us one way in which heat is at work in nature's workshop. The heat given off from the sun helps all living things to grow.



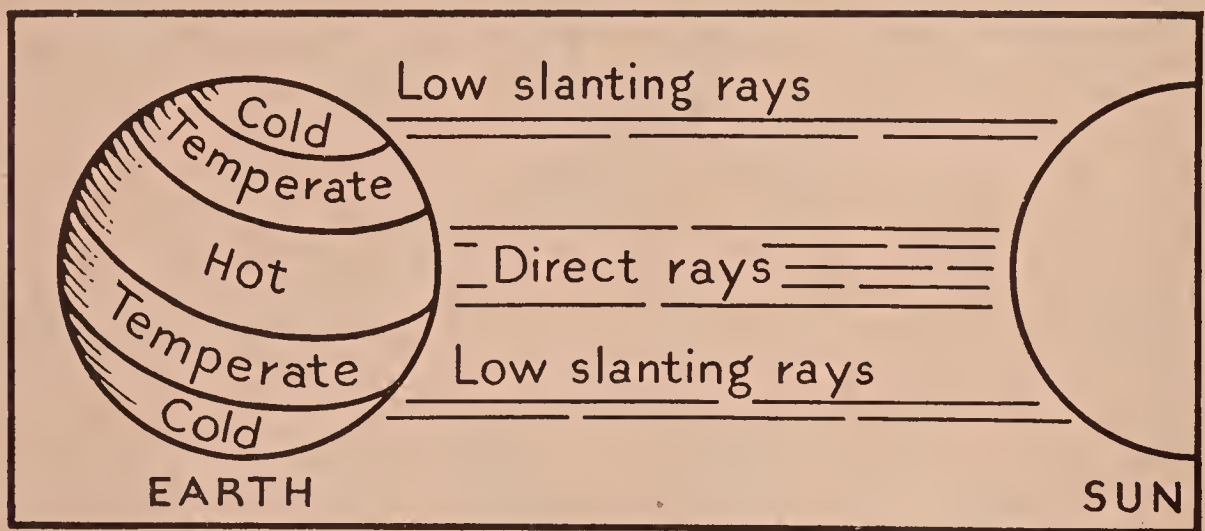
There is a second way in which heat is at work in nature. The heat of the sun changes, or modifies, climate. The heat from the sun warms the earth; the heat from the sun warms the waters that are on the face of the earth. All day long the sun is heating the earth and the water on it.

Because the earth is shaped like a ball, the sun does not heat all parts of the earth equally. Set a pan of water out in the open, and test its temperature with a thermometer in the early morning, at noon, and in the evening. See how much warmer the pan is at noon. When the sun is overhead and shines directly down on the water, the sun can heat the



water easily. When the sun is low and its rays shine on the pan at a slant, it cannot heat the water so easily.

So it is with the sun and the earth. In parts of the world where the sun's rays shine directly on the earth, the climate is hot. That is why the airmen found India hot. In parts of the earth where the sun's rays shine on the earth less directly, the sun heats the earth less. That is why the



airmen found cold weather in Alaska, Greenland, and Iceland.

It is for this same reason, as we learned from our pan of water, that the weather in any one place may grow hotter or colder as the sun rises higher or sinks lower.

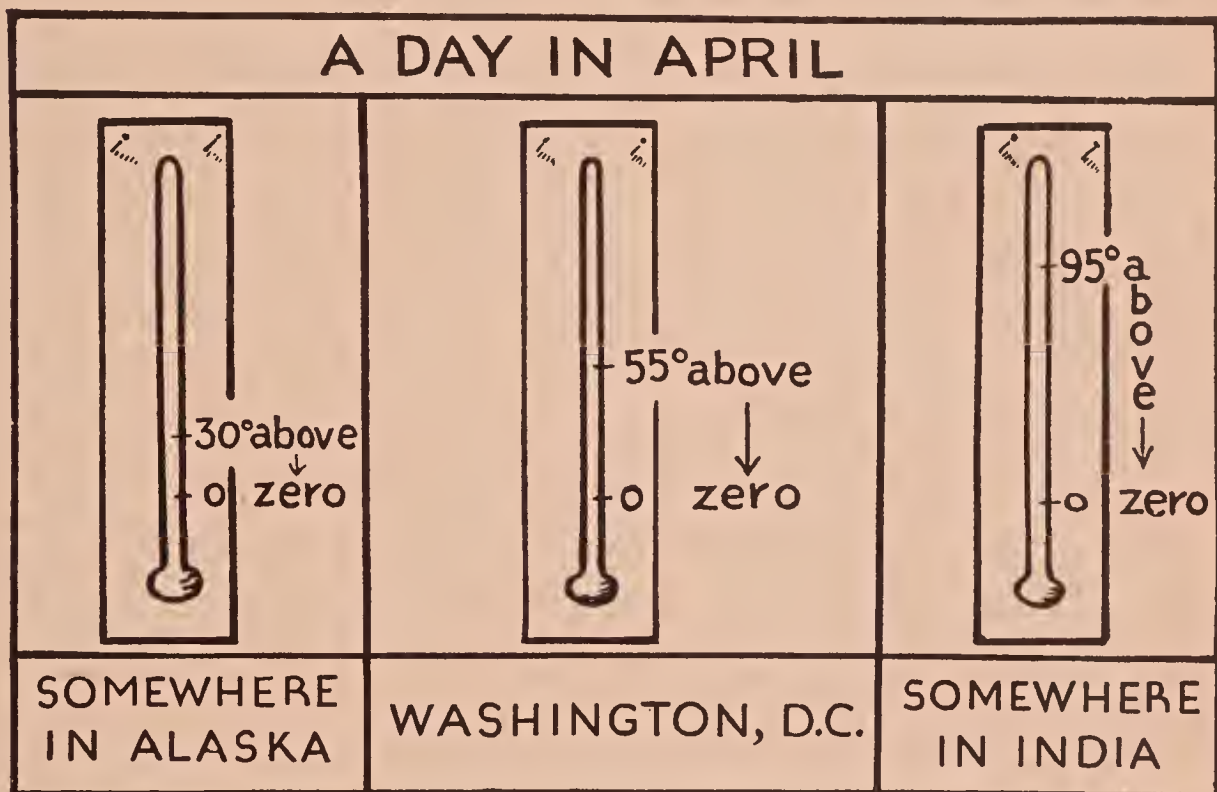
We know, too, that the weather in any one place changes from day to day according to the seasons. This is because the sun shines on the same parts of the earth at different angles at different times of the year. In those months of the year when the sun shines on your home most directly, it is summer. In those months when the sun shines on your home least directly, it is winter.



### The Sun and the Force of the Winds

We have learned how the sun heats the earth. To learn how the work of the sun helps cool the earth, we shall now read about the sun and the winds.

The sun creates the winds that cool the earth. You may



ask, "But how does the sun, which is hot, create those winds, which are cool?" Let us see.

As the sun heats the earth, the hot earth in turn heats the air. When air gets warm, it rises, just as smoke rises out of chimneys and smokestacks. When the heated air above some warm place rises, cooler air from some other spot rushes in to fill its place. So we get a movement of air upward and also from the south, the north, the east, and the west. A wind from the south is called a south wind; a wind from

the north is called a north wind. Winds from the east and west are called east and west winds.

A breeze is a gently moving flow of air. A wind is a swiftly moving flow of air.

The heat from the fiery sun starts winds on their way. Once they are blowing, the winds perform their own work in nature's workshop.

Can you think of any of the work performed by winds? Watch the clouds moving up above. What drives them through the air? You are right. The winds. What other work do the winds perform? Winds help to change the weather. Warm winds may bring rain; cold winds may bring snow. Summer breezes help to cool plants, and so save them from burning up in the heat of the sun.

Winds carry the seeds of plants and scatter them. That is one way the wild forests, the wild fruits and berries, spread over the face of the earth.

### The Work of Water

So far we have considered the work of fire and wind. Now let us see the work of a third force in nature, that found in the work of water.

The sun heats the air and starts currents of wind on their way. The heat of the sun also warms the water everywhere over the surface of the earth, in the soil as well as in rivers, lakes, and oceans. The heat of the sun changes water to vapor, which rises in the air and forms clouds. Winds drive the clouds. Later, the water in the clouds falls as rain, snow,

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or sleet. In Chapter 16 you will read more about the way in which the sun and air change water to vapor. You will read about the journey of a drop of water in a cloud from the ocean to our drinking cup. Here we shall study only how water works after it has fallen as rain.

As you know, the surface of the earth is not even. The fliers in their trip around the world saw level country, valleys, hills, and mountains. The water that falls on level country sinks into the earth. What happens to the water that falls on the hills and mountains? Some of this water also sinks into the earth. The rest flows downward in brooks and rivulets. Wherever the earth slopes gently, the water moves slowly. Where the earth slopes sharply, the water moves rapidly. We call such a place *rapids*. When water flows over a cliff, there is a *waterfall*.

Whether the water is flowing on the earth or underground, moving swiftly or slowly, it is working in many ways. On mountain sides forests may have been growing for centuries. The fallen leaves, decaying on the ground, make the soil rich. Plants grow well in such topsoil. The water carries this rich topsoil down from the mountains into the valleys. It is because of this topsoil that many river valleys make good farming country.

On its downward course the flowing water does other work. The water, carrying fine particles of sand and rock, wears away the banks of streams on either side. Swiftly flowing water carries small rocks down with it. The water, flowing over and around rocks, shapes them, rounding them. Water



often works into the crevices of rocks, too. In cold countries this water lying in the crevices freezes in winter. As the water turns to ice, it expands and must have more room. If there is no room for the water to expand, the ice, as it forms, splits off pieces of rock.

Water works on rock even under the surface of the earth. The water that trickles down through the soil finally reaches rock. When it does, the water flows downward along the rock. The action of the moving water wears away the rock and changes it to soil.

The most wonderful example of the power of water is found in the Grand Canyon in Arizona, where the Colorado River has helped wear a deep path through miles of rocky cliffs.

A river flowing through mountainous regions is very swift. It gathers, as it rushes along, particles of rock and stone that help scour away the sides of the rock. If the rock is soft, as in the Grand Canyon, a very deep ravine, or canyon, may be cut. Of course this takes a very long time.

We must not forget another important work that water performs. All plants and animals would die without water; they need water to help keep them cool. They also need water to help them dissolve the minerals that they need for their food.

In order to see more clearly how important water is in the growth of plants, let us perform another experiment.

Fill two small flowerpots with good garden soil. Plant a bean in each. Place both pots in the sun. Water one pot



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immediately after planting; continue to water it, adding a cup of water once a day toward evening. Do not water the other pot. In time a plant will grow out of the bean in the well-watered pot. The bean in the other pot may sprout from the water that was in the earth; but without additional water, it will not grow. Clearly, the water in the first pot worked to aid in the growth of the plant and the production of the beans. From this experiment we can see why farming lands are found wherever there is much rain as well as plenty of the sun's heat, and why there are deserts wherever there is burning sunlight without much water.

### The Soil

Now let us turn to study the soil, a most important material in earth's workshop.

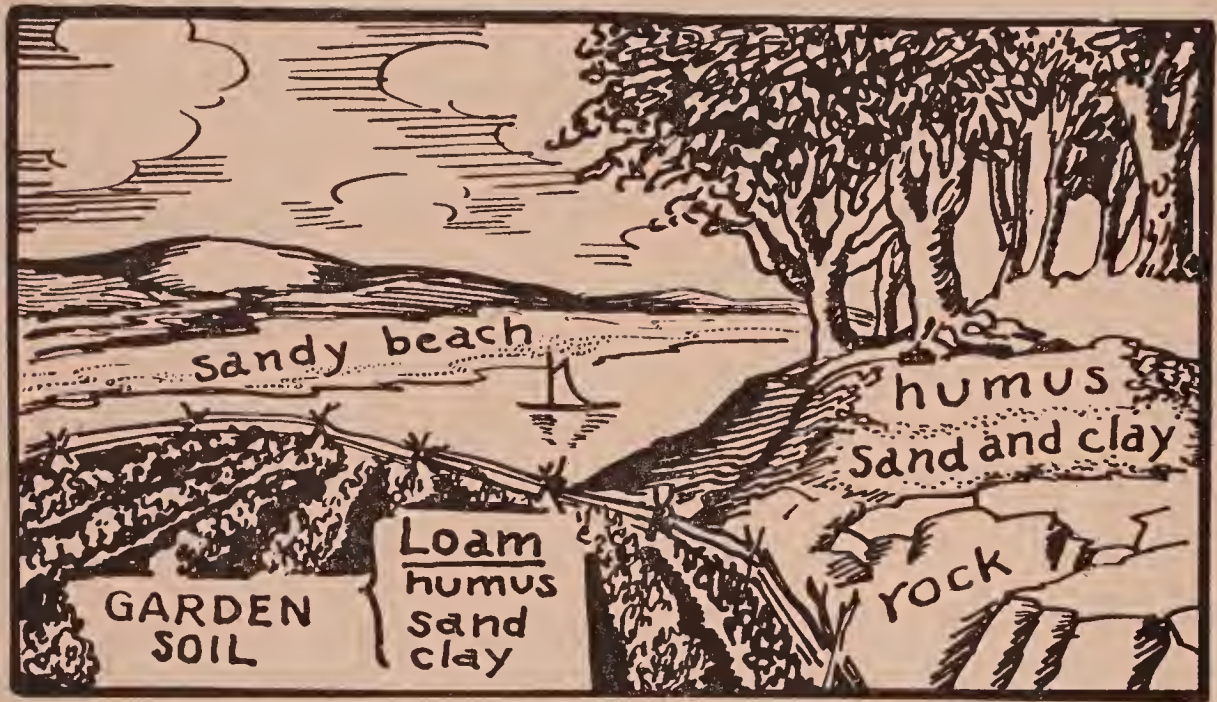
Let us examine the soil to see what it is made of and what part it plays in nature's workshop. We shall study the soil, not in the flowerpot, but out in the woods.

When you walk in the woods, you will find that much of the topsoil is loose and dark brown or almost black in color. This rich soil is called *humus*. Humus is soil that contains decayed plant and animal matter, such as dead leaves and insects. Humus makes good food for growing plants.

If you now take a shovel and dig deep enough below the humus, you will come to *bed rock*, as it is called. If you dig down anywhere on the surface of the earth, sooner or later you will come to bed rock.

As you are digging down toward the bed rock of the earth,

you may see some round stones. You will know from their round faces that these stones once lay in the beds of streams where running water smoothed off their rough edges. You may see layers of shale, a stone that has been made crumbly by the force of underground water. You will find rough



stones hard as iron; yet if you put one of these in a glass of water, you will notice that there will soon be a layer of sand at the bottom of the glass. Where does this sand come from? It comes from the surface of the rock, which has been slowly crumbling, as heat, wind, and water worked upon it to break it down.

At first, before there were plants and animals on the earth, all the soil was rock. But in time the action of heat, wind, and water, as well as other forces, broke down much of the rock into sand, silt, clay, and gravel.

*Gravel* is the coarsest form of soil. It is a mixture of sand and pebbles.



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*Sand* is the form of soil next in fineness. It is easy to work, but so loose that water can wash all humus out of it. It dries out quickly. Some plants are started in sand, but afterward they are transplanted to other soil that has more humus in it.

*Silt* is a still finer soil.

*Clay* is the finest soil. It is sticky when wet, and almost as hard as rock when dry. It is a heavy soil and holds water a long time. It is stiff and hard to work. Roots cannot go very deep into a clayey soil, but grass grows well in such soil.

The best soil for most garden vegetables, grains, and fruits is *loam*, which is a mixture of sand, clay, and humus. Loam is a fertile soil, because it helps the plant factory to get air, food, and water. The sand keeps the soil loose so that air can get to the roots. The clay holds moisture. The humus helps to feed the plants.

When a crop is growing, it is using up the humus in the soil. Before the farmer plants again, he may have to use a fertilizer to put back into the soil a fresh supply of the plant foods that humus contains.

You could not live by going out into your garden and eating the soil, but a plant does get food from soil. As the plant grows from the soil, it can furnish you with food and furnish many animals with food. Green plants are often called the food-makers of the world, since upon them depends the food of all animals and human beings.



We have told many things about the work of heat, wind, and water, and yet we have not half told all the work that these three workers are doing in nature's workshop. We have not told all, but we have told enough to help you understand, as you read on, how the work of nature, joined to the work of man, aids in supplying us with the things we need.

In the largest sense of the word *home*, the earth is our home — the whole earth with the skies above our head and the soil beneath our feet. So far in this book you have read many things about this earth of ours, but most of us today live in cities where we are likely to think little about the earth and the ways in which we get things from it. In the next chapter we shall read about a time when all the people in the world lived so close to the earth that men, women, and children obtained all the things they needed directly from the earth.

Things to Do

1. The class should get a thermometer, learn how to read it, and keep it in some suitable outdoor place. Make a class chart on which the class can keep a daily record of the outdoor temperature at different times of the day, all through the term. See what you can learn from this chart about some of the work of the sun, from hour to hour, and from season to season.

Date	9 A.M.	Noon	3 P.M.

2. Make a chart to keep a record of the winds. See whether you can find that winds from any one direction usually bring rain or snow.

Date	9 A.M.	Noon	3 P.M.	Rain or Snow (hour)

3. Describe an apple tree as a factory that makes apples. Explain as best you can how the heat of the sun, the wind, and water all help this factory to produce apples.

4. You can invent a game or play in which Heat, Wind, and Water tell of the work they do in nature's workshop.

5. An interesting thing to do would be to go into the country to look for as many signs as you can find of the work that the sun, wind, and water are doing.

6. On that trip you can collect examples of different kinds of soil; you can also collect rocks that show the action of water.

7. Find any signs of the work of water on your school playground or yard. Name the kinds of soil you find here.

8. Use pictures to describe the work of water in nature's workshop.

9. Collect samples of the four different kinds of soil. Describe each and give its use.

## Chapter 6

# WHEN THE WHOLE WORLD WAS A WILDERNESS

In the spring we all like to go walking in the woods to see the wild flowers. No gardener planted the seeds of these flowers in the woods. But when the ice and snow have left the northern hills and valleys, these wild plants push their way upward through the soil and are soon in blossom.

Sometimes as we walk through the woods, we startle a rabbit along our path. Does any one own that rabbit? No. It is a wild creature and belongs to no one.

### Wilderness Places Today

There are some places in the world where almost all plants grow wild, as do the flowers we see in the woods; where all the animals are as wild and untamed as that rabbit.

We may call a place where plants and animals grow wild, a *wilderness*. In the cold northern countries, such as Iceland and Greenland, most of the land is wilderness. The few plants that grow are wild plants. Except for the Eskimo dog and the reindeer, the animals are wild animals. These northern countries where it is cold almost all the year round are called the *Arctic* countries. Seals, polar bears, walruses, and caribous are some of the Arctic wild animals.



In India, where the climate is hot all the year round, much of the land is wilderness.

If we look at a globe, we shall see a line that runs all the way around the middle of the earth, dividing it into two parts called *hemispheres*. This is a line that men have drawn there. It is called the *equator*. The countries that lie near the equator are called *tropical* countries.

A wilderness in a tropical country is usually a jungle. In a jungle the trees grow thickly and a rich vegetation of all kinds covers the earth. This heavy growth is due to the great heat of the sun and the frequent rains. Because of the dense growth, jungles are very hard to get through.

In the jungles there are many wild animals, such as the tiger, the lion, the leopard, and the jaguar. There is a great variety of brightly colored birds. There are also many poisonous snakes. Hunters have brought back many of these jungle creatures that you can see if you visit a zoo or a circus.

There was a time within the memory of our grandparents when the country not far from our own homes was as wild as the Arctic countries or the tropical jungles are today.

There was a time many thousands of years ago when the whole world was a wilderness in which all plants grew wild and all animals were wild creatures.

How did the people who lived in the wilderness of long ago get what they needed?

### Cave Dwellers: Life in the Wilderness Long Ago

Learned men, called *scientists*, have found out how some early wilderness dwellers found shelter. In different parts of the world caves have been found that are thousands of years old. In the earth of these caves scientists have found stone tools that must have been made by men. In this way we know that caves were the shelters of men and women and children who lived long before any one thought of building houses.

For food the women who lived in those days gathered berries and fruits of different kinds, wild grains, nuts, and the roots of plants. The men hunted for wild animals.

When the boys grew up, they became hunters. The girls learned from their mothers to gather wild plant foods. They also helped their mothers make clothes from animal skins. We can easily imagine how busy these people must have been, for all the day they were occupied with making, gathering, or hunting the things that they needed in their daily life. When night set in and the woods resounded with the howling of animals, these people must have been glad to creep into their cave shelters for their night's sleep.

#### Questions to Answer

1. What is a wilderness? Find the sentence on page 48 that tells you what a wilderness is.
2. Do you know where there are places today like those described?
3. Do you think that India today is entirely a wilderness? Are there any large cities in India?
4. What other countries are named in this chapter?

### Things to Do

1. Find on your maps and globes all the places mentioned in this chapter.

2. Find the equator. Tell why it was given this name. Tell what part of the word helps you.

3. Write a list in your notebook of the names of all the wild animals mentioned in this chapter.

4. Perhaps you can bring pictures of them to show to your class.

5. If there is a zoo near your home, perhaps you will want to visit it and see some of these wild animals.

6. Draw pictures of them.

7. Draw pictures that will show the meaning of the words below:

jungle      blossom      cave      hunter      creatures

8. Show on a map the parts of the world that are a wilderness today. Describe those places. How did the people of long ago who lived in the wilderness get what they needed?

9. Name some berries, grains, and nuts that are good to eat.

10. Copy these sentences and put in the blank space the word or words that make each statement correct:

(1) We call a place where the plants and animals grow wild a \_\_\_\_.

(2) Northern countries where it is cold almost all the year round are called \_\_\_\_ countries.

(3) The countries that are near the equator are called \_\_\_\_ countries.



### A Puzzle

The first and last letters of each word are given in this puzzle. Each dash between them means a letter left out.

Write the words on a slip of paper or in your notebook. You can add the meaning of the word, too.

1. E - - - - O. A race of people living in the Arctic countries of North America or in Northeastern Asia.
2. W - - - - S. A marine animal of the Arctic Ocean.
3. E - - - - - R. A line dividing the earth into the northern and southern hemispheres.
4. I - - - - - D. An island in the Arctic region.
5. G - - - - - - - D. An island northeast of North America.

## *Chapter 7*

### **HOW MAN CONQUERED THE WILDERNESS**

In this chapter we shall read how inventors helped man in the conquest or control of the wilderness.

For a long time the whole world was a wilderness in which many people lived by hunting. While some hunters were still hunting for wild game, other men had begun to tame some of the grass-eating animals.

These animals were gentle, and soon became used to men. The men who trained them became the first herdsman. Whenever the herds were moved to new pastures in search of grass and water, the herdsman and their families had to follow. So they became wanderers, or nomads, following the herds of grazing animals and dwelling in tents that they carried with them from place to place.

#### **How Early Farmers Fought the Wilderness**

Some of the hunters and herdsman learned that by planting seed in good earth, they could raise wheat and other grains. No one knows how men first discovered this. But after men learned how to raise plants from seed, they also learned that they could raise better crops if they stayed in one place to watch and take care of them. So these men settled down to till the soil and live as farmers.

More than seven thousand years ago there were farmers

in the land of Egypt. Egypt is a country in northern Africa. The Nile River, which flows through the land of Egypt, overflows its banks once a year, spreading a rich topsoil over the fields. This topsoil helps to make the land fertile. Because the land is fertile, it is easy to grow crops in Egypt.

In Egypt long ago farmers built their houses near their fields of grain. Sometimes these houses stood close together in small villages. A few of these villages grew into towns.

When the Nile River overflows its banks, much of Egypt along the river is like a great sea. People, in those early days, were in danger of losing their homes, their animals, and their own lives in the flood. The water had to be controlled. Their homes and lands had to be saved.

To save their houses and lands, the early farmers of Egypt had to build great dikes and small islands where they could stay during the late summer months while the river was overflowing.

Such a piece of work needed great numbers of people. No one man or his family could do this work alone. People had to call upon their neighbors for help.

So, because of the dangerous floods, the Egyptian farmers and villagers learned to join forces with one another and to work together. After a time all the farmers, villagers, and townsmen in the land were joined together as one nation under one strong ruler and one set of laws.

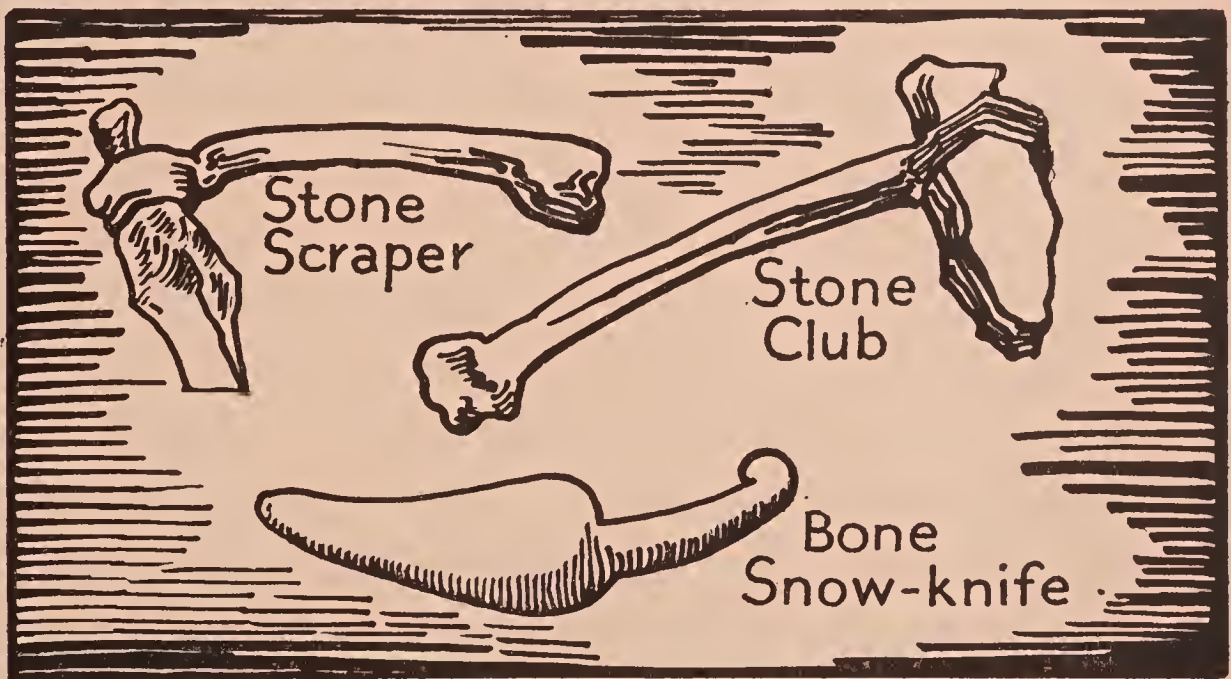
It took many, many years for Egypt to grow into a nation from such small beginnings. But it grew into a powerful nation, one of the oldest in the world.



After Egypt became a nation, slowly the hunters and the herdsmen in other lands also gave up their old life. They cleared the forests for farming; they built villages and towns.

### Man, the Inventor and Tool-Maker

Man never could have conquered the wilderness had he not been an inventor.



The Eskimos Used Simple Tools

The early wilderness dwellers had learned how to make tools out of wood, stone, and bone. Out of wood they made clubs, daggers, and arrows. Out of hard stone they made hammers, knives, and axes. These tools not only helped in doing work, but they also helped in fighting fierce and dangerous animals.

After a time people learned how to make woolen cloth on hand looms. Women were the first spinners and weavers.

They made the first baskets, and some say they discovered the making of pottery. Later you will learn how important these discoveries are to us today.

Fire is one of the greatest helps that man ever learned to use. No one knows how he discovered it. It sometimes happens that a tree struck by lightning takes fire and burns for days. In some parts of the world there are *volcanoes*. These are mountains in which fires burn. At times these fires burst out of the mountain tops, and streams of *lava*, or hot, melted rock, flow down the mountain sides, setting fire to the forests.

### How Fire Helped in Conquering the Wilderness

For ages the sight of fire must have terrified man, but the time came when people learned to make fire serve them. They learned how to keep a fire burning by piling fresh fuel on the blazing logs. As the flames blazed up, the firemakers fed the fire. Later men learned how to start fires themselves by rubbing two pieces of wood together or knocking one stone against another.

With fire, people baked their clay pots. The fire cooked their meats. It helped to warm them through the cold winters.

Watching their outdoor fires, people noticed that heat melted some of the earth's substances. One substance that they saw melted by fire was copper.

When copper or any other metal is melted, it can be poured into a mold of any shape; and as it cools, it hardens in the shape of the mold. With this knowledge, men became metal

workers. They made hammers, axes, knives, swords, daggers, and other metal tools.

The metal workers of Egypt learned the art of making tools, first from copper; then from bronze, which is copper mixed with tin; then from iron. Metal axes helped men to clear the wild forests. With metal axes they cut wood and built themselves wooden ships. Then they put sails on their ships, so that the winds would carry them more swiftly and easily across the waters.

### How the Wind Helped in Conquering the Wilderness

From this time on, the wind, as well as fire, helped man in conquering the wilderness.

At first the Egyptian ships sailed only on the Nile River. Then Egyptian ships, and ships built by other peoples, sailed out on the Mediterranean Sea, which lies between Europe and Africa. These ships carried the knowledge of farming and town-building to the hunters and herdsmen in Europe.

For thousands of years the people of Europe were busy taming their own wild lands by turning them into farms and towns and nations. So England, France, Spain, and the other nations of Europe came to be. Each nation lived under its own ruler and had its own laws.

### Finding the New World Wilderness

Then, in the year 1492, a sailor named Christopher Columbus led a fleet of three sailing ships westward across the



Atlantic. The fleet that Columbus commanded discovered a new world, America, where the Indians lived.

A great part of America was then an untamed wilderness in which Indian tribes obtained most of their food by hunting.

Before many years ships from Europe were crossing the Atlantic Ocean. They were carrying European men, women, and children, who were coming to the American wilderness to live. They were bringing with them the seeds and the metal tools that they had learned to use in Europe. They were bringing sheep, cattle, and other tame animals that they had raised in Europe.

### Conquering the New Wilderness

In America these people used their metal axes to chop down the wild forests, to clear farms, and to build towns in the part of the country near the Atlantic Ocean.

From these early colonial days until about one hundred and fifty years ago, the farmers and the townspeople who lived in our country had to obey English kings and English laws. Then they fought a war that freed them from the rule of England, and they formed themselves into a separate nation, the United States of America.

Later, when more and more persons came from Europe, many men and their families put their household goods, seed, and farming tools into covered wagons, and set out to conquer the wilderness in the western part of the American country. Still a large part of America remained wilderness,

especially the part of our country that lies west of the Mississippi River.

### New Tools Help to Build the American Nation

More than one hundred fifty years ago men learned how to use steam power, and so were able to invent new means of transportation. They invented steamships to sail upon the American waters and steam locomotives that helped to carry great numbers of men and women across the American continent. All along the way the newcomers in the West turned the wilderness into good farms, thriving villages, towns, and cities. They helped to build new states that joined with the other states in the United States of America.

So far, in their fight against the wilderness, men had been aided by fire, wind, and steam power. Now men learned to use a strange new force called *electricity*. Other men invented the telephone, the telegraph, the cable, the wireless, the radio, and the gasoline motor, which made possible the automobile and the airplane.

The electrical inventions are aiding in the further conquest of the wildernesses that are still to be found in various parts of the earth.

Today the radio and the airplane are being used by explorers who are pushing their way into the portions of the earth as yet untamed. Did you read of the use of the airplane and the radio in a journey of discovery to the South Pole not long ago? Admiral Byrd and the men who went on that journey used many modern inventions.

## Questions to Answer

1. What was the way of living of the early peoples called nomads?
2. What caused them to change their way of living?
3. How did the invention of tools help men to conquer the wilderness?
4. Of what two metals is bronze made?
5. What tools have you ever made of wood? Of stone? Of bone?
6. What is an inventor? An explorer?
7. How did fire, wind, and steam power help in conquering the wilderness?

## Things to Do

1. Describe the life of a cave man, of an ancient herdsman, of an ancient farmer.
2. Find on your maps and globes the place where the earliest farmers lived.
3. The words below tell something about ways of living and working. Tell something about each one.

primitive	till	townspeople
cave men	mold	rulers
hunters	farmers	looms
herdsmen	villagers	colonial

4. Copy these sentences and put in the blank space the word or words that make each statement correct:

- (1) People who wandered from place to place for food and clothing were called \_\_\_\_.
- (2) \_\_\_\_ are mountains in which fires burn.
- (3) Hot, melted rock called \_\_\_\_ flows down the mountain side.



## *Chapter 8*

### THE NATIONS OF THE EARTH

We who live in the United States today live on farms or in villages or in towns or in cities. More than one-half of us live in towns and cities. The others live on farms or in villages.

Do the people in all other lands live as we do?

No. The conquest of the wilderness and the building of nations like ours have not gone on equally in all lands.

#### Life in the Wilderness Lands

In the tropical countries there is still much wilderness, because the warm climate and the rapid growth of vegetation make it hard to keep the jungles clear for farming. In the jungle people build no cities; they do not band together as great nations.

In the Arctic countries in many places the land is too cold for farming, except for a short time each year. So here, too, the land is mostly wilderness, and people live for the most part by hunting and fishing. The men sometimes hunt in small bands, but the Arctic dwellers have not united to form great nations.

If we look at the under side of our globes, we shall find the Antarctic lands. Here, as in the Arctic lands, the winters are

long and cold. The Antarctic lands are still wilderness, and there are no Antarctic nations.

### **Strong Nations in the Temperate Zones**

Where are the nations of today? Let us see. Between the Arctic lands and the tropics there is a part of the world called the North Temperate Zone. Between the Antarctic lands and the tropics lies the South Temperate Zone. This makes five zones, or belts, around the earth — the Arctic, the North Temperate, the Tropical, the South Temperate, and the Antarctic.

In the two temperate zones, the climate is neither too hot nor too cold. Each year there are four seasons: spring, summer, autumn, and winter. During the spring people plant their seed. It grows through the spring and summer. In the fall farmers gather their harvest.

The strongest nations in the world today are the United States in North America; England, France, Italy, and the other countries in Europe; Japan in Asia. These lie within the North Temperate Zone.

### **How Work Today Is Divided: Farms, Cities, Nations**

Long ago when the whole world was a wilderness and there were no farms or cities, men obtained all the things they needed from the earth through their own work. Ever since people have been living on farms and in cities, work has been divided. Farmers raise food for themselves and for the city

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dwellers. The workers in the city factories make things for themselves and for the farmers.

In our own country, because of new tools invented within the last hundred years, the work of the farms and cities is becoming more divided than ever. Most of the farmers and the city workers of today use tools that help them do just one thing. There are farmers, for example, who raise only wheat. There are city workers who make only shoes or some one part of a shoe.

Almost everything that the farmers and city workers need comes to them through the labor of people they have never met, living in places they have never seen.

So the work of the whole world is divided. Each country is busy making the things that it can make best and exchanging its goods for those made by some other country. Railroads, steamships, airplanes, telegraphs, and telephones are helping in the exchange of goods through all parts of the world. No matter how many miles separate us from other people, messages and goods can be sent across these miles, so that we no longer live apart from other peoples. The people of all nations need one another.

### **To Understand the Work of the World, Read On!**

We are living in an interesting time, but because work is so divided between city and country, between nation and nation, few of us see with our own eyes how the earth provides the things we need, and how the workers prepare these things for our use. The rest of this book will tell you more



about the world of today, so that you will see in your mind's eye how man's present ways of doing things grew out of the past, how people live, and how they work to obtain from the earth the things that they need.

### Questions to Answer

1. What is a tropical country?
2. What nations of the earth lie in the tropical regions?
3. Where are the temperate zones?
4. Which of the zones do you live in?
5. How do you spell and how do you pronounce the zone around the North Pole? That around the South Pole?

### Things to Do

1. On a map of the world or on a globe find the strongest nations of today.
2. Tell some of the ways in which people of all nations need one another.
3. Tell in your own words what you learned in this chapter.
4. Copy these sentences and put in the blank spaces the word or words that make each statement correct:
  - (1) The strongest nations in the world today lie within the \_\_\_\_ zone.
  - (2) In the two temperate zones there are \_\_\_\_ seasons.

## PART III

### *FEEDING THE WORLD*

#### CHAPTER

9. Why We Need Food
10. How We Get Our Meat
11. Milk, Cream, Butter, and Cheese
12. Poultry and Eggs
13. Food from the Sea
14. Wheat and Other Grains
15. A Basket of Plant Foods
16. Water and Salt





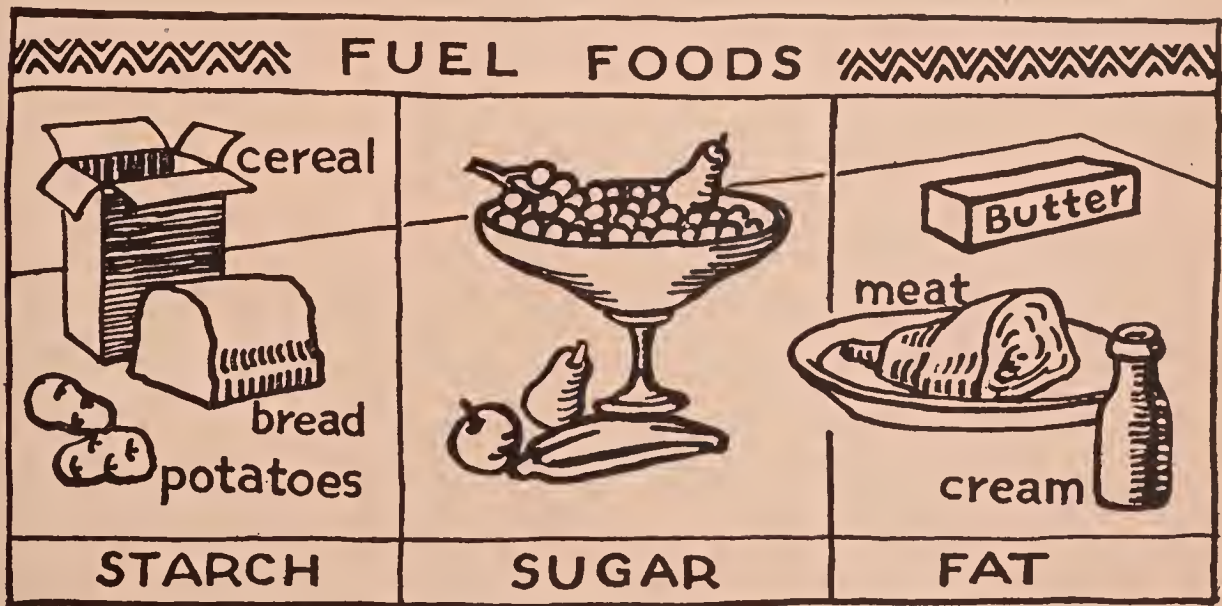
## Chapter 9

### WHY WE NEED FOOD

Every day, in the morning, at noon, and in the evening, we eat. We are hungry, and we must eat because our bodies need food.

But why do our bodies need food?

One reason is that food is fuel for our bodies, which are like engines. Day and night our hearts beat like pumps.



Our lungs draw in air and then force it out again. During the day we run, we pull things, we carry things, we study.

When our bodies work, they use up heat. Food is fuel to keep up this heat.

A chauffeur who wants fuel for his automobile drives to a garage for gasoline. When our bodies need more fuel, we must look to the earth for fuel foods.

The fuel foods that we obtain from the earth are starch, sugar, and fat. Potatoes, bread, and cereals contain starch. Apples, honey, and grapes contain sugar. Meat, butter, and cream contain fat. When we eat these fuel foods, they supply the heat that our bodies need for their work.

There are other reasons why we need food.

Food helps to repair our bodies. It also helps them to grow.

When the parts in an automobile engine wear out, the chauffeur takes the car to a garage. The garage mechanic mends the old parts or puts in new parts. When our body needs repair, we must have the right kind of food with which to repair it.

We must have lean meat, milk, fish, cheese, eggs, nuts, green vegetables, cereals, and fruit.

We must have foods that contain lime, iron, and salt. The body needs these minerals as part of its food. Minerals help in the growth and repair of the body.

We must have water, too. Every food that we eat contains some water. But this is not enough water for our bodies. We need to drink water freely both with our meals and between meals. Plenty of water will help to keep us well. Without water, our bodies cannot get the whole value of the other food we eat.

### What We Should Eat

Until a short time ago most people believed that by eating a great deal of food, they would be sure to satisfy their

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bodies. But during the last few years people have learned that *what* we eat is more important than *how much* we eat. We must know how to choose the kinds of food that will give our bodies strength and the kinds that will repair them when they are worn out.

For boys and girls who are still growing, eating the right foods is especially important.

Boys and girls should eat plenty of fat, especially the fat in milk, butter, cream, fish, and eggs.

Boys and girls should have plenty of starch and sugar in their meals. They can get starch by eating bread, cereals, potatoes, beans, and peas. They can get sugar from honey, fruits, and milk. They should not eat much table sugar or candy.

Fuel foods (fats, starch, and sugar) should make up the larger part of a day's meals. But a good portion of each meal should be the foods that help boys and girls in their growing.

For growth boys and girls should drink much milk every day. They should eat cheese, fish, and meat. Milk will supply calcium needed for the bones and teeth. Fruits and some vegetables, such as tomatoes, will add iron, which the blood needs.

Every boy and girl should eat some green leafy vegetables, such as cabbage, celery, spinach, and lettuce.

### Foods of Other Lands

We have just read about the foods that we and the other people in this country eat. Let us see what foods people in other lands have for their meals.



Out on the deserts in Africa and in Arabia, where few animals live and few plants grow, people drink camel's milk. Here and there on the deserts there are green spots called *oases*. In an oasis water flows and the date palm grows. The desert people eat dates from their palm trees.

In the moist tropical jungles there are many wild plants bearing fruits and nuts that are good to eat. The jungle people eat bananas, coconuts, and many tropical vegetables. They also eat fish, which they catch in their rivers.

In the cold Arctic lands, the Eskimos hunt the walrus, the seal, the caribou, and the polar bear for meat. They catch fish in the icy waters. The Eskimos have few plant foods to give them sugar and starch for fuel, but they make up for this lack by eating great quantities of fat.

In the tropical jungles and in the cold Arctic countries, people get their food from wild plants and wild animals, but we get most of our food from animals and plants that are raised for us on farms.

Long ago men everywhere had to be contented with such foods as could be found or cultivated near their own homes, but nowadays foods can be shipped great distances to many parts of the world.

The United States ships wheat to many countries of Europe. We buy coffee from South America and Java, and tea from Asia. The English buy much of their food from other countries, even from far-away Australia.

Since man has invented methods of preserving foods, it is possible for many countries of the world to exchange food

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products with other countries. In this way a great world trade in foodstuffs has been built up.

### Questions to Answer

1. In this chapter you learned why your body needs so many different kinds of food. Can you name some of them?
2. Name some of the foods that we buy from other countries. Why do we have to buy them?
3. Name some of the foods that we sell to other countries. Why do we sell them?

### Things to Do

1. Make a collection of pictures for your bulletin board showing foods from all parts of the world.
2. On an outline map of the world, show where the different kinds of food you have read about are found. Show where coffee and tea grow and how they must travel to reach the United States. Perhaps you can find out how many miles these foods travel.

## *Chapter 10*

### HOW WE GET OUR MEAT

When we want to eat meat, we do not have to go out to hunt wild animals, as the cave men did. Where we live, man no longer lives by hunting. In the woods near our homes, rabbits, hares, and squirrels may live, but there are not enough of them to feed us all.

#### Getting Meat in Wilderness Days

Before the white men came to this country, the Indians who lived here hunted bear and deer and ate their flesh. Out on the plains west of the Mississippi River the Indians hunted buffalo.

When the white men first came to America to live, they also hunted wild animals for meat. But before long they brought over from Europe sheep, cattle, and hogs, such as farmers in Europe had been raising for a long time.

Now, when the white men had these animals, they were able to get beef from their cattle; mutton from their sheep; ham, bacon, and pork from their hogs.

For a long time the white people kept on spreading across the country, turning the wilderness into farms and cities. As they cleared away the forests, many of the wild animals disappeared. The farmers, therefore, were glad to have the meat from their cows, sheep, and hogs. They ate some of



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this meat themselves. The rest they sold to the people in the cities.

### Meat for the Cities Today

Within the last fifty years the cities have grown large, and the small farms in our country are no longer able to supply all the people in the neighboring cities with meat. So today we get most of our meat from a few parts of the country, where millions of cattle, sheep, and hogs can be raised and fed more easily than anywhere else.

We get much of our beef, lamb, and mutton from the pasture lands in the western and southwestern part of the country. For ages, buffalo lived on these plains. But when the Indian hunters and the white men killed off the buffalo, herdsmen began to raise sheep and cattle. They raised their herds on large tracts of land called *ranches*.

### Meat from the Ranch

The rancher, who owns the ranch, may have many thousands of cattle or sheep. A cattle rancher has cowboys to help him with his herd. The cowboys water the cattle. They take care of injured or diseased animals. They 'break' the horses for riding, and conduct the 'round-up.'

Each ranch owner must know his own cattle. There are several ways of marking cattle so that no mistake will be made when the herd is sold. The most common method of marking them is called *branding*. Each owner has his own initials or symbols, which are burned into the hide of the animal. These initials are recorded in the official books of

the state, so that no other owner can use the same mark or claim cattle branded with it.

When the time comes to sell the cattle, the cowboys go out for the round-up of the animals, which have been running over the great unfenced plains. The soil there is not fertile, and there is not enough rainfall to raise crops; but even with little rainfall, wild grass grows readily, and it is on this wild grass that the cattle have been grazing. Surrounding the cattle from all sides, the cowboys pick out the animals that are marked with the brand of their ranch and drive them all into a great yard, or *corral*.

From this corral the cattle are driven to the railroad station. Here they are loaded on trains and usually sent to some place in the corn belt for fattening. When they are fat enough, they are shipped to one of the meat-packing cities, where meat is packed and made ready for shipment to all parts of the country. Chicago and Kansas City are two important meat-packing cities.

On the same train with the cattle there may be many cars of sheep sent from the sheep ranches that are near the cattle ranches.

When the sheep and cattle reach the packing cities, they are unloaded in dozens of fenced-off pens, called *stockyards*.

### Meat from the Corn Belt

In the stockyards there are also thousands of hogs that have come from the farming plains in the states that lie near the Great Lakes. The Great Lakes lie between the

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United States and Canada. This part of our country is called the *corn belt*, because on these plains where rain is plentiful, the soil rich, and the summer long, corn grows well. As hogs get fat on corn, the farmers in the corn belt raise many hogs. As cattle also like corn, many young cattle from the western ranches are shipped to the corn belt for fattening.

In the summer and fall the farmers in the corn belt feed their hogs and cattle fresh corn from the fields. Ears of corn are stored in corncribs for hogs; fodder corn is grown for winter food for cattle. Harvesting and storing this winter food is one of the most important tasks of the autumn season. A corn-harvesting machine goes through the field of corn, cutting and binding the stalks into bundles. These are chopped up and stored in a building called a *silo*.

A man feeds a bundle of cornstalks and leaves into a rotating set of knives, which cut it into pieces. These pieces are either blown through a chute into the silo or are carried into the silo on a belt.

The silo is usually built as part of the barn. A silo is a building shaped like a cylinder. You have surely noticed silos when you have been driving through the country. If you have driven through farm country in the early autumn, you may have seen the farmers busy filling their silos with winter food for their cattle.

Cattle that have been shipped to the corn belt for fattening are sent, when ready for market, to the stockyards. From the stockyards the cattle, the sheep, and the hogs go to the slaughterhouses where they are killed and prepared



for packing. Almost every part of these animals is put to some use.

### Preparing Meat for Market

Some of the meat is hung in large cold-storage plants ready to be put on trains and sent to the cities to be sold in meat markets. Some is used for making sausage. Some is salted or smoked so that it will keep for a long time. Some is preserved and put into cans that are sealed tightly. The hides of the animals are sold for leather; the horns of the cattle and sheep are used for button-making; hoofs are used in making glue.

The meat is put into cold-storage rooms. Here a freezing fluid is run through pipes, and the cold pipes make the rooms as cold as ice boxes. Meat stored in these cold rooms will remain fresh for months.

The refrigerator trains that carry fresh meat to the cities are cooled by ice or by cold pipes in the same way that the cold-storage rooms are cooled.

Every morning the refrigerator trains that come into the railroad stations near our homes bring fresh meat from packing houses. The butcher's wagon gets the meat and carries it to the store where we buy it by the pound as we need it. At the grocer's we can also buy canned meat.

The meat that we buy may have been raised fifteen hundred miles from our homes. Ranchers, cowboys, sheepherders, farmers, trainmen, and hundreds of workers in the stockyards and in the packing houses have helped in bringing

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that meat to us. Some meat makes a longer journey than fifteen hundred miles before it gets to market.

### Exporting and Importing Meats

In England there are about forty million persons. Many of them live in cities and work in factories. The farms are few and small. As there is little room to raise great herds of sheep and cattle, the English people buy, or import, much of their meat from other countries. When one country brings things in that it has bought from another country, we say that it is *importing*. When a country sends things out that it has sold to another country, we say that it is *exporting*.

England imports meat from the United States, from South America, and from Australia. Both in South America and in Australia large herds of sheep and cattle are raised on the immense plains of wild grass.

As these countries have not many people to feed, they are able to sell, or export, much meat. The meat exported from South America to England travels five thousand miles to reach its market. The meat exported from Australia to England is brought in ships over a distance of twelve thousand miles.

### Questions to Answer

1. What is the difference between the way the cave man got his food and the way we get ours?
2. Where does the meat that your mother buys at the market come from?
3. How would you describe life on a cattle ranch?

4. What is a round-up?
5. How does the owner of a ranch know his own cattle?
6. What work does the cowboy do on the ranch?
7. What kind of food does the ranch-owner give his cattle?

Where does he get the food?

8. What did you learn about England, Australia, and South America?

9. Where are the cities in the United States that are noted for meat-packing?

10. Why are they so far from the cattle ranches?

### Find the Best Answer

1. Cattle and sheep are mostly raised
  - (a) in the East
  - (b) in cities
  - (c) on ranches in the West

### Things to Do

1. Construct a ranch on the sand table in your classroom.
2. Draw a picture of a ranch.
3. Draw a picture of a round-up.
4. Draw a picture of a mark that might be used to mark all the cattle in one herd.
5. Draw a picture of a stockyard.
6. Draw pictures that will show what each of the words below means.

branding              silo              stockyard              corral

refrigerator car              corn crib

7. Find the Great Lakes on your map of North America.
8. Find, on the map of the United States, the states in which cattle-raising is carried on.
9. Find, on the map of the world and on the globe, Australia, South America, England.



## *Chapter 11*

### **MILK, CREAM, BUTTER, AND CHEESE**

Milk is a good food. It quenches our thirst and satisfies our hunger. Milk contains sugar and fat, which are fuels for our bodies. Milk is rich in proteins, which help mend our body cells. Milk also helps us grow. For little babies, milk is a most necessary food.

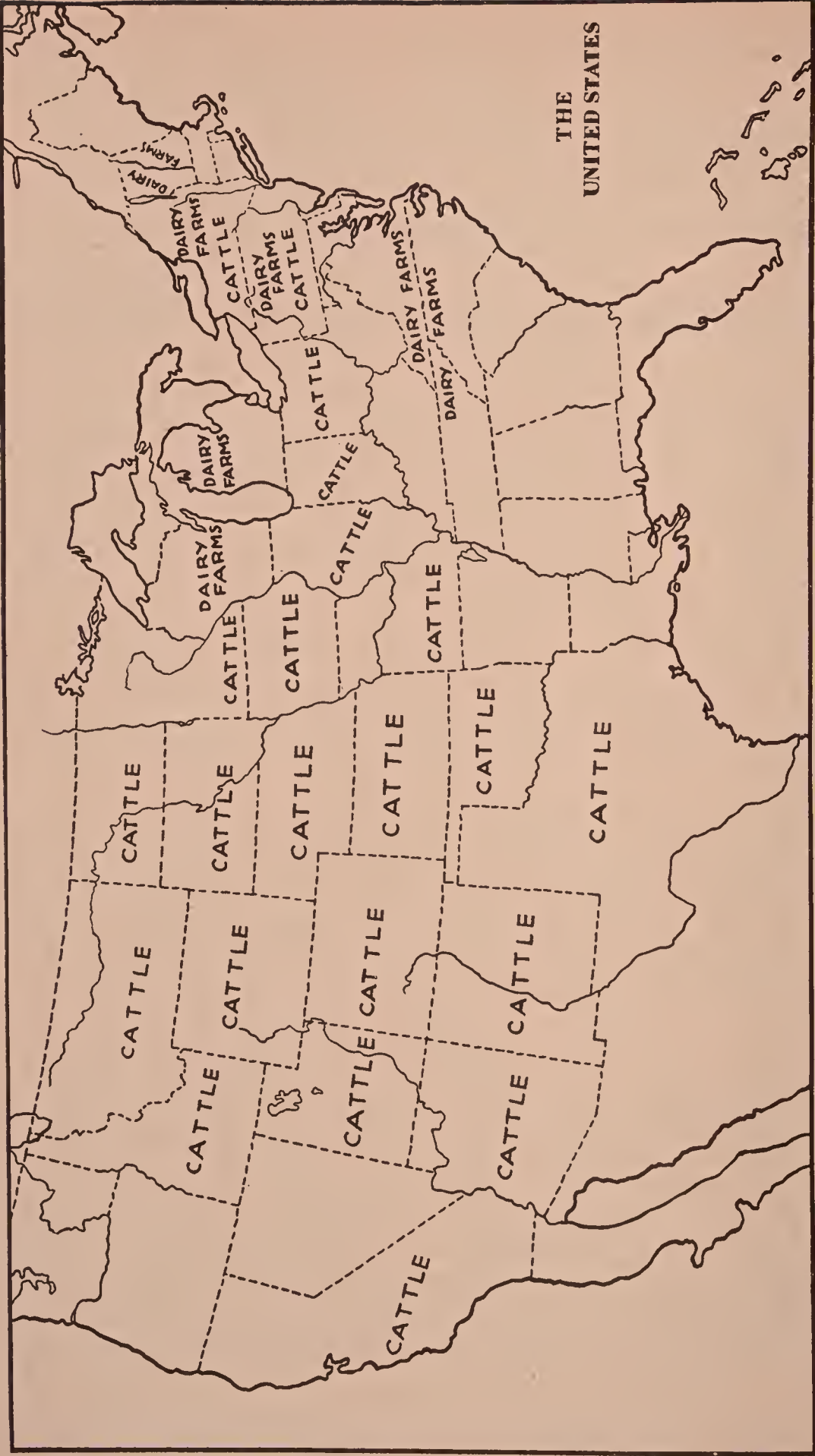
In the last story we read about the cattle ranches, where cows are raised for meat. But how about the cows that give us our daily milk? Do they live out on the cattle ranches?

No. Milking cows are raised on dairy farms that are scattered throughout the middle-western and middle-Atlantic states and New England.

#### **Cows Brought to America**

The best milk cows are known as Holstein-Friesians, Ayrshires, Jerseys, and Guernseys. The first Holsteins were brought to this country from Holland; the Ayrshires came from Scotland; the Jerseys came from the island of Jersey, which is near France. The first Guernsey cattle came here from the island of Guernsey, which is near the island of Jersey.

Can you imagine the old sea captains and sailors bringing



This Map Shows Where the Cattle Ranches and Dairy Farms Are Located

these cows across the Atlantic? For the few weeks on the ocean the captain and his mates had good milk to drink. Then when they reached America, they sold the cows to American farmers, who turned them loose on their pasture lands.

Today the descendants of those seafaring cows are giving us milk.

### Visiting a Dairy Farm

If we arrive at a dairy farm early on a summer morning, we see the farmer letting the cows out of the large barn where they have been milked. The cattle follow their leader up the road, across the brook to the pasture, where fresh green grass is growing. There they eat the grass for an hour or so. This grass goes down into one of their four stomachs. Then as the day grows warmer, the cattle lie down in the shade, bring up the grass they have swallowed, and chew this cud. After an hour or more of chewing, they swallow the cud, and it goes into their other stomachs.

In the evening the farmer drives his cows back into the barn, where he milks them. In the early morning they are milked again. Often cows have so much milk that the farmer has to milk them three or four times a day. On some large dairy farms the milking is done not by hand, but by milking machines.

Until a few years ago many farmers did not keep their barns so clean as they do now. The dairy farmer of today knows how important it is for him to keep his cows and his stables clean. In many large dairies where milk brings a



high price, all employees are dressed in clean white clothing while working about the cows. Every morning the stalls are thoroughly washed by a hose playing water on the cement floors. Before a cow is milked, she is carefully washed.

Milking is done by machines, which are carefully cleaned. The milking machines are covered to keep the milk free from dust and dirt. You can see that machine-milking is cleaner than milking by hand into open pails.

Milking machines also save labor, for most of these machines milk two cows at once. One man caring for two machines can milk four cows in less time than he can milk one by hand.

Milk readily picks up odors. Good dairy farmers have their milk houses apart from the other farm buildings. The milk house has a cooling tank, so that the temperature may be cool enough to keep the milk sweet. The best milk houses have cement floors and are carefully screened to prevent flies from coming into them.

When the weather permits, the milk utensils are placed outside, so that the sun's rays and the fresh air may help to purify them.

What does the cow eat during the cold months when there is no grass in the pasture? In these seasons the farmer keeps his cattle in the barn and feeds them on hay, which is dry grass. He raises this grass in the summer, gathers it, and stores it in the hay barn. He also feeds his cattle the food plants, like corn, clover, and alfalfa, that he has stored in the tall silo beside his cow barn.

### Bringing Milk to the City

Each day the farmer puts his milk into cans. Instead of carrying his few cans of milk to the city, which may be a day's journey from his farm, the farmer sells his milk to a milk company.

Each day the milk company sends trucks to gather the cans of milk from many farms. Then the company sends the milk to the city by train or truck. In the city some of the milk is sold to grocers in cans. The milk is also sold in quart and pint bottles.

Clean milk bottles are necessary to keep milk in a clean condition. They are washed in large washing machines, brushed inside and out with brushes, and rinsed with clean, sterile, hot water.

The milk bottles are carried on trucks to the machines that fill them with milk. Some of these machines fill as many as eight dozen bottles a minute, filling and capping them without the help of human hands.

Bottles of milk that are shipped on trains are packed in boxes, surrounded by chipped ice, and placed in refrigerator cars.

Sometimes milk is shipped in bulk instead of in small quantities. It is cooled and placed in large tanks with double walls very much like the thermos bottle in which your mother takes hot coffee or cold milk when you go to the woods on a picnic.

### Keeping Milk Pure

On some of the bottle caps we can read the word *pasteurized*. This means that the milk has been heated to a temperature of 150 degrees and has been kept at this temperature for twenty minutes, then rapidly cooled. This method of making milk pure was discovered by a Frenchman whose name was Louis Pasteur. The word *pasteurized* comes from his name.

The company pasteurizes some of its milk because the heat kills little plants called *bacteria*, which live in milk. These bacteria are so small that you cannot see them without a microscope. But if they are not killed, the milk spoils more quickly and is then no longer fit for food.

### Foods Made from Milk

Did you ever read the poem that Robert Louis Stevenson wrote about a cow?

The friendly cow all red and white  
I love with all my heart;  
She gives us milk with all her might  
To eat with apple tart.

The cow also provides us with cream, butter, and cheese. We get the cream, butter, and cheese from the cow's milk. If milk is allowed to stand for several hours, cream will rise to the top, or the cream can be separated from the milk more quickly by machine separators. That part of the milk that is left is called *skim milk*. Many persons like cream



with fruit or cereals. Almost everybody likes ice cream, which is sweetened cream made stiff by freezing.

Butter is made from the fatty part of the cream. Butter can be made in a small hand churn by pounding the cream with a wooden dasher. This pounding separates the butter fat from the rest of the cream. The part of the cream that is left is called *buttermilk*. Today most of the butter in our country is made in large machine churns that make hundreds of pounds in one churning. Some of this butter is sent to the cities in tubs. Some is weighed and wrapped in small packages. In one of these two ways it reaches the city grocer.

Cheese is made from another substance in milk, called *casein*. Some farmers who do not sell their milk to milk factories, sell it to cheese factories. Here the milk is heated in vats; and as it sours, it divides into two parts: curds, which contain the casein, and whey. The curd is made into cheese.

Thus you see that the cow gives man not only meat but also milk, cream, butter, and cheese.

#### Questions to Answer

1. Can you name the different kinds of cows that are bred in America?
2. Can you name the native lands of these different cows?
3. How is milk pasteurized? Why do dairymen pasteurize the milk?
4. What other foods are made from milk and cream?
5. What does the government of your city or state do to be sure that you have good milk?

### Things to Do

1. Find, on your map of the United States, the states where the great dairy farms are located.
2. Imagine you are spending a day on a dairy farm; write a story about the day.
3. Tell how the dairymen prepare milk for the market.

### A Puzzle

The first and last letters of each word are given in the puzzle. Copy in your notebook and fill in the missing letters. After you have done that, put the correct words in the blank spaces.

1. D — — — Y. A place where —, —, and — are produced.
2. F — — — — E. A country in —.
3. P — — — — — E. Grassland for — to feed upon.
4. G — — — — — — Y. The name of a breed of —.

## Chapter 12

### POULTRY AND EGGS

Every morning at breakfast time, in many homes throughout our land, people eat eggs.

To supply our tables with eggs, thousands of poultrymen and farmers raise chickens on their farms.

The chicken is a bird that has been tamed by man.

In our country today, there are many wild birds, such as the robin, the owl, the hawk, and the eagle. Some of these birds live with us all the year round. Other birds, like the wild goose and the wild duck, fly southward in the winter to find themselves new homes in warmer lands.

All the birds of the air were originally wild, building their own nests, fighting their own battles, finding their own food, and flying where they wished. But long ago, after men tamed cattle and sheep, they tamed some of the birds as well. They tamed the goose, the duck, the turkey, and the chicken.

These birds that men have tamed and that they raise for food are called *poultry*. A farm where they are raised is called a poultry farm.

The story of each of the poultry birds is interesting. This chapter will tell the story of the chicken.



### The Story of the Chicken

Far away in tropical India there is a bird called the *jungle bird*, which is really a wild chicken. This jungle bird lays about four eggs a year. Thousands of years ago some people in Asia succeeded in taming one variety of wild chicken, which may have been much like the jungle bird that lives wild there now.

While the jungle bird, itself, remained wild, farmers in Persia, India, and China raised on their farms the chickens that had been tamed. The chickens crowed in the barnyards; they roosted in trees; they ate such scraps of food as the farmers threw to them. The barnyard hens laid more eggs than the wild jungle birds from which they came. Later the farmers in Europe also learned how to raise these chickens.

When farmers came from Europe to this country, they brought chickens with them and raised them here. The farmers and their families ate some of the eggs that the hens laid. They sold some eggs to people in the towns. They allowed the mother hens to sit upon the rest of the eggs for twenty-one days. It takes a chick that long to be hatched from an egg.

Today the small farm can no longer raise enough chickens to supply the people of our great cities with fowls and eggs. There are now large farms where as many as fifty thousand chickens can be raised at one time.

### Visiting a Chicken Farm

First we visit the incubator house, where heaters are used to hatch the baby chicks. The boys from the farm are arriving with baskets full of eggs that they have gathered that day. We follow them into the house. We see them put the eggs into trays. Then they put the trays into incubators that hold thousands of eggs.

The heaters in the incubators will keep the eggs warm for twenty-one days. At the end of that time when the boys remove the trays, they will find that the chicks have broken through the egg shells.

The chicks are then put into brooders. These brooders are small houses where little stoves keep the chicks warm. The chicks are carefully fed and grow rapidly.

On chicken farms there are laying houses, each holding hundreds of hens. Here the hens lay their eggs. There are hens that lay more than two hundred eggs a year. Some hens lay as many as three hundred eggs in one year.

So we see that the egg that we eat for breakfast has an interesting story. The story begins somewhere in Asia with a relative of the wild jungle bird of India. Then the story comes into Europe and carries us across the ocean to America.

In America there are also large duck farms, large goose farms, and large turkey farms.

These poultry farms of America add to our supply of food. But there is a way in which even wild birds help to feed us.

### How Wild Birds Help Us

Many of the wild birds feed on insects. Many insects feed on growing grains, vegetables, fruit trees, and other plants that give us food. The birds that eat these insects save a large part of the farmers' crops.

Many birds feed on seeds. In the past, when farmers saw birds eating grains, their first thought was to shoot them. But today we know that birds that eat seed really help the farmers. It is true that they may eat some grain seeds, but they eat many more seeds of useless weeds and in this way, as well as by eating insects, the birds make it easier for the farmer to raise his crops.

### Questions to Answer

1. What is an incubator? What is a brooder?
2. In what ways are birds a help to the farmer?
3. In what parts of the world did men first develop chicken farms?
4. Why is chicken farming an important occupation?
5. Can you figure how many dollars a farmer might get from selling the eggs that one good hen lays in one year?
6. Does the farmer have to buy food for his hens?



## *Chapter 13*

### **FOOD FROM THE SEA**

Long ago in the days when men lived by hunting, they learned that some fish are as good to eat as some land animals. So they caught fish as best they could and ate them. Once they found out how to make nets, they used these to catch their fish. When they learned how to make boats, they went out in boats to fish in the rivers and in the lakes. Later, when they learned how to build bigger ships, they sailed on the ocean to catch fish.

Now all over the world people eat fish. If they cannot get fresh fish, they buy dried, smoked, or canned fish.

#### **The Fish We Eat**

There are many different kinds of fish, but the kinds people in this country eat most often are cod, haddock, mackerel, halibut, herring, whitefish, and salmon. Cod, haddock, mackerel, halibut, and herring live in the ocean. Whitefish are found in the Great Lakes.

Salmon are hatched in rivers, but they live much of their lives in the ocean. When salmon are ready to lay their eggs, they return to the rivers in which they were hatched. They swim up the rivers, leaping the falls to reach the

shallow waters, where they lay their eggs. In the western part of the United States there are some great rivers flowing into the Pacific Ocean. Each autumn salmon come up these rivers from the ocean, and here fishermen catch them.

Along the bottom of the oceans there are valleys, mountains, and plains, just as on dry land. Fish are usually found in greatest numbers over the shoals, or shallow places, where the ocean bottom lies only a little way, perhaps fifty to six hundred feet, below the surface of the waves. Here sea plants grow; small fish feed on the sea plants; and large fish feed on the smaller fish. These shallow places where fish are abundant are called *fishing banks*.

### Catching the Fish

Few of us ever think, when we eat fish, that there are tens of thousands of fishermen all over the world who spend their lives in getting us this food.

Let us see a few of the ways in which fishermen catch fish for us.

Boys who live in the country near brooks or rivers often fish with poles, lines, and hooks, on which they put small fish or worms for bait. In some lands fishermen catch fish by spearing them or by harpooning them with spears tied to ropes. But fish poles, spears, and harpoons cannot catch enough fish for the hundreds of millions of people who live in the world. Most fish are caught by other means.

To catch many fish at one time, men use nets made of strong cord knotted or woven together in such a way as



This Map Will Show You Many of the Places Mentioned  
in This Chapter



to leave open meshes, much like a big tennis net. These nets are made in different sizes. There are nets so small that men can manage them by hand. There are nets so large and heavy that they have to be lowered and raised by steam power.

When steamboats carrying large nets reach the fishing banks, each boat lowers its net into the water. Weights of lead help the net to sink; then, as the ship moves through the water, the net slowly closes on the fish that are swimming in its path. Small fish escape through the meshes, but the big fish are prisoners; and when the net is raised, they are emptied into tanks in the hold of the boat.

Another way to catch fish is by the use of long lines to which many smaller lines with baited hooks are attached. This kind of fishing is usually done from sailing ships.

Three times a day fishermen leave these sailing ships in small dories. In each dory there are two kegs containing the line. One man rows the dory; the other slowly lets out the lines, which may be a mile long. While he is still lowering the line, he can feel the weight of the fish that are being caught on the baited hooks. The kegs that have been thrown overboard serve as buoys, supporting the long line, which grows heavier and heavier with its increasing load of fish.

After a time the rower guides the dory back along the line. The fish are removed. The hooks on the short lines are freshly baited and thrown back into the water. Then the men row back to their ships to unload.

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Going out in a dory is dangerous business. The waves are often high and rough. If a fog rises, the men have to listen for the ship's fog horn to help them find their way back. If the wind is against them, so that they cannot hear the fog horn, they may lose their ships. Many a dory has drifted on the ocean for days before being picked up.

In the winter, even when all goes well, the men must face bitter cold. The fishing boats sometimes return to port covered with ice.

### Bringing Fish to Market

To catch fish is not enough. Fish spoil easily, and if we are to have them for food, they must be kept from spoiling. Some fish are packed in ice in the hold of the ship. When the ship reaches port, they are repacked and sent to the fish stores near our homes where we can buy them fresh. Some fish are salted, because salt helps to keep them from spoiling. Codfish are laid out to dry on land. A good many of the salmon caught in the rivers near the western coast are dried and smoked. Smoked fish, as well as salted fish, will keep a long time. A great number of the salmon are taken to factories where machines cut them and pack them in air-tight cans.

Most of our ships that catch fish in the Atlantic Ocean sail from a few coast cities in the part of our country that is called New England. Each of these cities sends out fleets of fishing vessels. These vessels do much of their fishing on the Grand Banks off the coast of Newfoundland. On the Grand Banks there are also fleets of fishing boats from France

that stay for three months and more. On the other hand, some of our fishing boats cross the ocean to catch fish in waters off the coast of Iceland, Greenland, and Ireland. The largest of these fleets sails from the city of Boston.

Fishing is carried on in the Great Lakes in much the same manner as on the ocean. Nets and baited hooks bring in quantities of lake trout, whitefish, lake herring, and blue pike.

The countries that face the oceans claim the water for three miles from their coast lines as their own fishing grounds. But outside this three-mile limit, the oceans are free to the fishermen of the world.

### Oysters

Oysters, which are shellfish, grow in places known as *oyster banks*, where the water is shallow, off the coast of the United States in many places. The states of Maryland and Virginia lead all other states in oyster fishing. The flesh of the oyster is enjoyed both fresh and canned, and the shells are ground up and fed to chickens to furnish them with certain minerals they need.

### Protecting Our Supply of Fish

Of late years, some men in our country have been giving much thought to fish. Some states have fish hatcheries, where fish are raised in pools and fed. Baby fish from the hatcheries are put into the state rivers and lakes to keep these waters well stocked.

Fish in the lakes and streams of our country are protected



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by laws called *game laws*. These laws order people not to fish at times when the fish are laying eggs.

Some nations have joined together to study ocean fishing, so that the ocean fish will not be destroyed. They are planning that their fishermen shall not fish during the time when mother fish are laying eggs from which the oceans will renew their treasure.

So we see that today the oceans that help to carry man from land to land are binding men together in other ways as well. Because the oceans' harvest of fish helps to feed them, the nations are joining hands as brothers to protect the food that they must share.

### Things to Do

1. Make a collection of pictures showing all the kinds of fish you read about in this chapter.
2. Make some drawings of fish.
3. Make a set of drawings showing the different ways men catch fish.
4. On an outline map of North America color the sections where fishing is carried on. If you do not remember, read the chapter again.
5. Tell how fish are kept from spoiling.
6. Find out, if you can, where the fish were caught that you had to eat recently.
7. Now that you have read this chapter, tell the meanings of the words that follow. Draw pictures of some of them. Make a word puzzle of others like the puzzles you were given in other chapters.

mackerel	codfish	harpoon	fisherman
halibut	valley	dory	fisheries
herring	coast	pole	factories
haddock	mountain	shoals	vessels
salmon	spear	buoy	bait

**Find the Best Answer**

1. Fish are found in greatest numbers
  - (a) in shallow waters
  - (b) in deep waters
  - (c) in the middle of the Atlantic Ocean
2. A dory is
  - (a) a fishing bank
  - (b) a keg
  - (c) a rowboat
3. The states leading in oyster fishing are
  - (a) Maryland and Virginia
  - (b) the New England States
  - (c) the states near the Great Lakes

## Chapter 14

### WHEAT AND OTHER GRAINS

A loaf of bread is on the table. We shall eat bread with our lunch. We had bread toasted for breakfast. For dinner we may eat rolls, another form of bread. Our cakes, cookies, biscuits, and the crusts of our pies are really bread.

#### Bread: a Plant Food

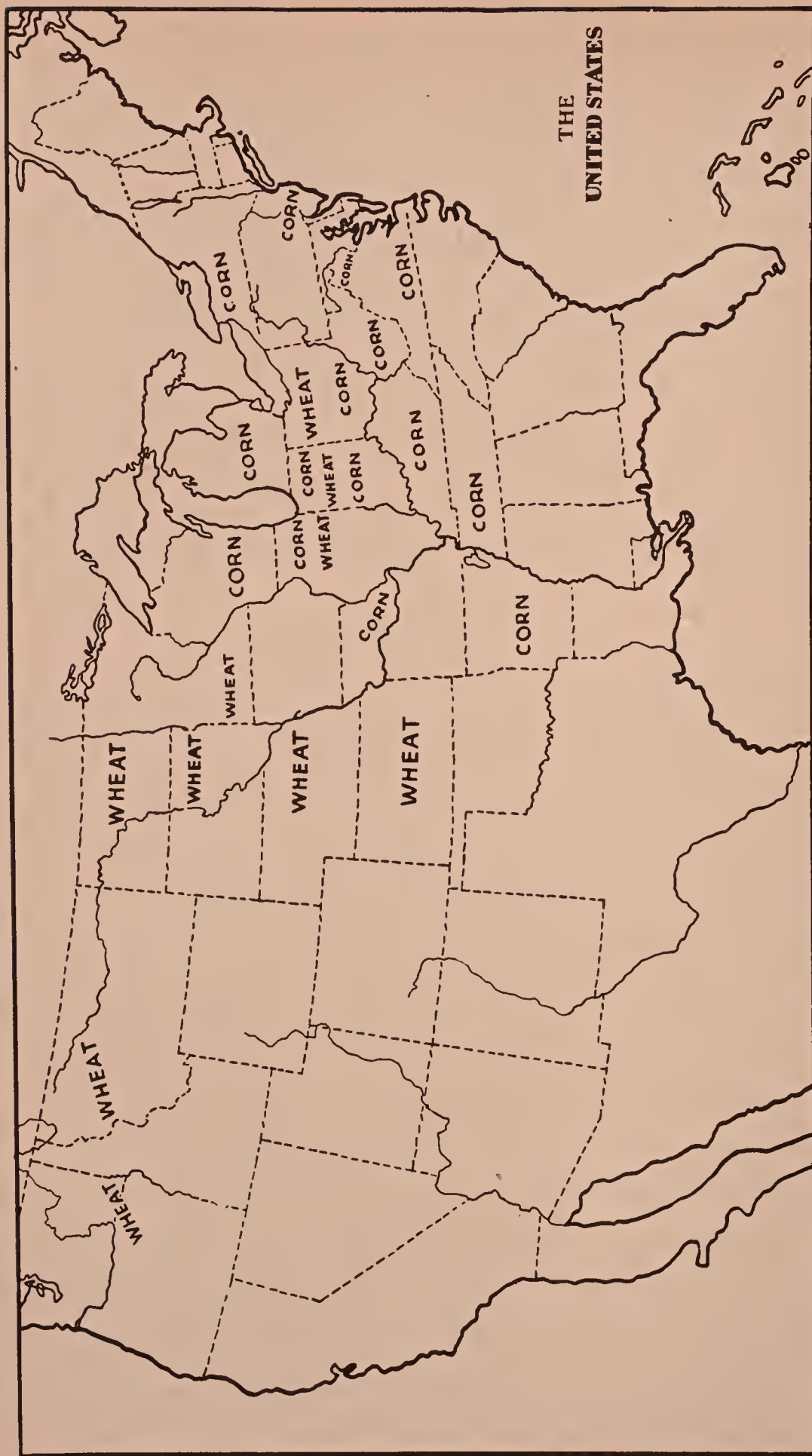
To make bread, white flour is mixed with water. Sugar, salt, yeast, and lard are added. This mixture is then kneaded by pounding and squeezing and then by more rolling and squeezing. Kneading the flour, water, salt, sugar, yeast, and lard together in this way gives us dough.

The dough is then shaped into loaves and put into a warm place to rise. When it has risen, it is put into the oven and baked. When it has cooled, the bread is ready for the table.

This bread does not look much like a plant food, but bread is plant food. The flour used in making bread comes from the seed of a plant called *wheat*. Wheat is a grain. There are other plants, like rye, oats, barley, rice, and buckwheat, which are also grains. All these plants bear clusters of small seeds, or grains, each of which is packed in a hard little shell.

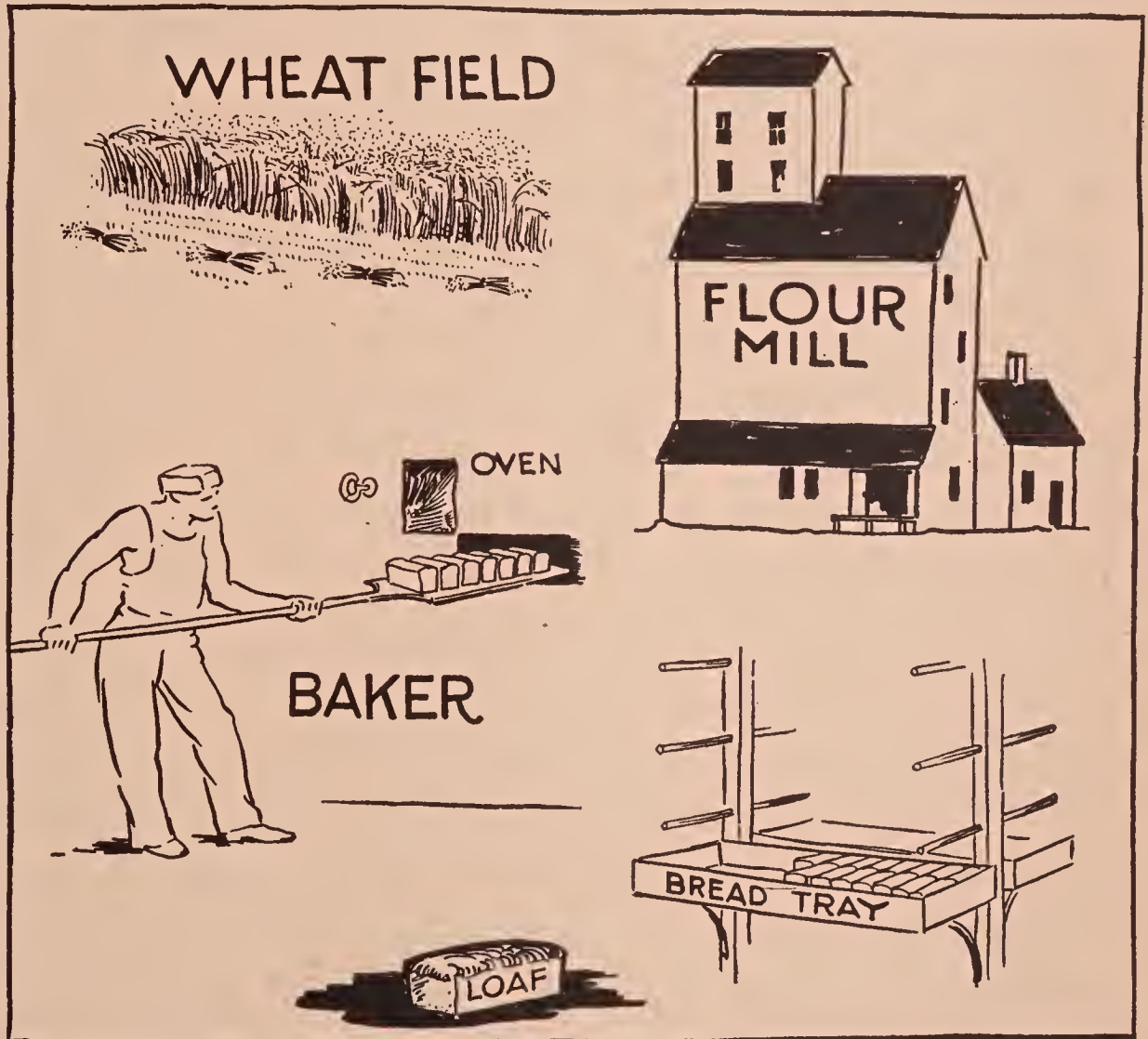
Corn is also a grain, but the seeds of the corn plant are clustered on a long stick, or cob.





# This Map Shows Where Wheat and Corn Are Grown in the United States

Bread can be made from the grains of rye, barley, and corn, as well as from grains of wheat. Our oatmeal is ground-up oats. Our buckwheat cakes are made from flour ground from the grains of the buckwheat plant.



Wheat and some of the other grains are among the oldest plant foods in the world. Long ago men learned that some wild grains are good to eat. Many birds like to eat the kernels of the wild wheat seeds. It may be that early man learned to eat wheat by watching the birds.

At first people ate the wheat seeds just as they found them on the plants. Later they made a coarse flour by

pounding the grains on a stone. By mixing this flour with water, they made a dough, which they baked on hot stones.

### Wheat-Farming in Ancient Times

We have read that when people learned to plant seed, they became farmers. In the Valley of the Nile, the farmers of Egypt raised wheat six thousand years ago.

When we go to the art museums in the large cities, we can see pictures of farming in old Egypt. These pictures were cut into stone by Egyptian artists, and they show us how the farmers of long ago raised wheat and prepared flour.

In breaking up the earth to make it ready for planting, the farmers of Egypt used wooden plows. They had oxen draw the plows across the fields. They sowed the seed by hand; and when the wheat grew to its full height and the long stalks bore their precious grains, they cut the stalks with a sickle. The farmers bound the stalks by hand and carried them to barns, where they were laid on the floor. Here donkeys, by walking on the wheat, stamped the seeds loose from the stalks; at the same time they loosened the shells from the grains. This is called *threshing* the wheat.

The next step was separating the little shells, or husks, from the grain. This is called *winnowing*. The Egyptians winnowed their wheat by throwing the grain into the air with flat wooden tools. As the grain fell, a man fanned the air, so that the light shells, or husks, would blow away.

How did the Egyptians make flour from this grain? They ground it between two round milling stones placed one above the other. The lower stone was partly hollowed out.



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The upper stone had a hole in it. The grain pouring through this hole fell into the hollow space between the two stones. The flour-maker turned the upper stone on the lower until the grains were crushed into a coarse flour.

In time the farmers in other lands learned easier ways of grinding the wheat. In some places they had donkeys or oxen walk round and round in a circle to turn the upper millstone against the lower. Some farmers built themselves mills in which the millstones were turned by the power of falling water. Near the water mills, they built dams of stone or wood to hold back the water; at one point close to the mill they let the water flow from the dam on to the blades of a mill wheel. The push and the weight of the water made the mill wheel go round. And as the wheel went round, it turned the upper millstone that was inside the mill. Here the farmers from the neighborhood could have their flour ground very quickly. Because of the great weight of the millstones, they could have their flour ground much finer.

When the colonists came from Europe to make their homes in America, they brought grains of wheat with them, but their wheat did not grow well in the fields that they cleared near the Atlantic coast. Instead of wheat they ate corn.

### A New Grain Found in America

Corn is an American grain that the Indians raised. The newcomers learned from the Indians how to plant corn and how to make good things to eat from the corn harvest. They ate johnnycake, which they made from cornmeal, a coarse corn flour. They ate succotash, a dish of corn and beans

cooked together. They dried the kernels of the corn in the sun until they became almost as hard as stone. Then they kept these hard seeds into the winter, when they used them to make corn mush. They made corn mush by grinding the corn into powder and boiling this powder in water.

As the white people went west in this country, they found one part of the land where for more than one thousand miles there were good farming plains. Plenty of rain would help corn and wheat to grow well there. This *corn and wheat belt*, as it is called, lies in the central and northern parts of the United States, around the region of the Great Lakes.

The farmers found that with the old tools they could not do all the work themselves. They needed new tools that would do the work more quickly than the old tools, which had hardly changed since the days of the Egyptian farmers.

### Machinery Brings New Ways of Farming

New farming tools were invented by American inventors. About the year 1831 Cyrus H. McCormick, an American farmer, invented a *reaper*, a machine that could cut several acres of wheat in less time than a man with a hand tool could cut one. This reaper and other inventions helped the farmers on the great farming plains.

Today on a large wheat field in the West the ground is plowed up by large steel *gang plows*, as they are called, drawn by teams of sixteen horses. On some farms the plows are drawn by tractors, run by gasoline.

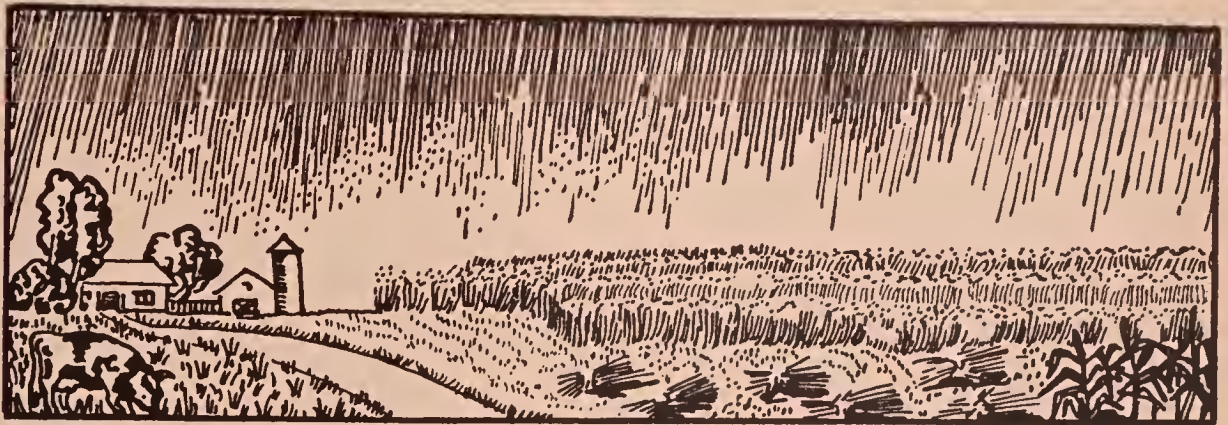
After the blades of the plow have cut wide furrows in the



soil, other machines, called *harrows*, are drawn across the fields to cut the furrows and smooth them.

Then a machine with many steel drills is drawn across the field. These *drills* sow the seeds of wheat into the earth.

In a few days pale green shoots, which look like grass, appear above the earth. The roots draw food and water from the soil. The leaves, helped by the sun, change the earth food into life cells for the growing plant. The wheat



A Farming Plain

grows higher. In a few months the tall stalks turn from green to yellow as they ripen. They bear heads of grain.

The wheat is now gathered by harvesting machines. These machines cut the wheat, collect the stalks into bundles, tie the bundles, and drop them in rows.

The bundles are then thrown into threshing machines run by a steam or a gasoline engine. Inside the thresher the grains are separated from the dried stalks, or straw. The husks are loosened and blown away. As the grains of wheat flow from the thresher, they are packed in sacks. On



large farms huge machines called *combines* reap, gather, and thresh the wheat as they are driven over the fields.

Even the grinding of the grain into flour is done by new tools. Railroads and steamships carry millions of bushels of wheat from the wheat farms to the large cities where they are stored in tall buildings, called *grain elevators*.

From the grain elevators the grain goes to the flour mills. Flour mills are still built near waterfalls, but the millstones are no longer turned directly by water wheels. They are turned by electric power engines that get their power from the falling water. One such electrically driven engine can help grind more flour than many of the old water wheels.

Even the baking of bread from flour is now done by new tools. Few women bake bread in their own homes. They buy bread from large bakeries, where most of the work is done by machinery.

### Corn and Rice

New tools are also used in raising corn. Some green corn is sold to the cities, and then we eat the kernels from the cob after boiling it or roasting it. Some of the green corn is sent to the canneries for canning. Much of the field corn raised in the corn belt is ground into corn flour, or corn meal, as it is generally called. The farmer also feeds corn to his cattle and hogs. In the winter he feeds his hogs ears of corn from the corn crib. He feeds his cows corn from the silo that stands beside his barn.

In China the people eat much less wheat or corn. They

eat rice, which is another one of the grains. They raise this rice in flooded fields. Rice takes the place of bread for the Chinese. Rice is also grown in the United States. Not so many years ago American Indians in some parts of this country gathered wild rice to add to their food supply. The picture shown here is from the American Museum of Natural



**Indians Gathering Wild Rice**

(From the American Museum of Natural History)

History. It shows one way in which the Indians gathered the grains of wild rice.

So, just as the deep sea yields fish to feed us, the earth bears grains to add to our daily meals. In our country today, with new tools to help them, farmers, working where grain grows best, raise more than enough to feed all the people. Giant flour mills grind the grains. Ships and trains carry our wheat, corn, and other grains to feed the workers in our own land and those in many other lands.



### Questions to Answer

1. What kinds of grain are used to make bread?
2. How is bread made?
3. How did men in ancient times plant and harvest their grain?
4. What American invented the first reaping machine?
5. How is the farming of wheat carried on today?
6. How is wheat ground into flour?
7. Where is much rice grown and eaten?
8. What can you find about chopsticks and their use?

### Things to Do

1. See how many kinds of grain your class can collect and exhibit.
2. Make a set of pictures showing the ways men have ground grain into flour.
3. Make a visit to a bakery, if there is one in your town; then write a few short paragraphs telling what you saw.
4. Draw some pictures to show the journey of wheat from the wheat fields to the flour mill, to the bakery, and into loaves of bread.
5. Be sure you know what each of the following words means:

bread	buckwheat	invention	kerosene
yeast	wheat	reaper	engine
flour	kernel	tractor	threshing
barley	plow	gasoline	grain elevator
dough	kneaded	clustered	harvesting

6. Make a word puzzle like the ones given you in other chapters.



## *Chapter 15*

### **A BASKET OF PLANT FOODS**

Here is a basket of food, brought in by the grocer's boy. We stand by and watch while he unpacks vegetables, fruits, nuts, tea, coffee, cocoa, chocolate, sugar, pepper, all of which are plant foods.

The grocery store is near by; but the basket, with its bright colors and its fragrance, is like a bouquet of food, gathered for us from many climates and from many distant lands.

People who live in the country or in small towns often keep gardens in which they raise their own fruits and vegetables. But in cities the yards are often not large enough for gardens, and people are too busy doing other work to spend their time raising foods. City people are busy making the many things that country people need, while country people are busy raising foods for city people.

Indeed, people could not live in cities at all unless country people sold them fruits and vegetables and milk.

You may like to know how farmers find a market for all the foods they raise.

#### **Fruits and Vegetables: Winter and Summer**

Many years ago the farmers took their own fruits and vegetables to market. Often they carried them in wagons

through the streets of near-by towns, selling them from door to door. But today farmers living near the same shipping point often belong to an organization. This organization is a group of men who take care of selling their farm products for the farmers who belong to it.

Fruits and vegetables are assembled, packed, and stored by these organizations and sold by them to the stores from which your mothers may buy their food.

In the winter, vegetables will not grow in the open in the northern states. For this reason, in the winter people in the North get most of their fresh vegetables from farms in the southern states where it is warm enough for vegetables to grow in the open all the year round. It is also possible to raise green vegetables in hothouses, under cover, in the North. These are much more expensive than those grown in the summer time, and not all people can afford to buy them. Today many people eat canned vegetables as well as fresh vegetables.

So much for the vegetables that the grocer has sent us. See the luscious fruits that the basket holds. Here are apples and pears from the northern states, where the summers are short. Here are grapefruit, raisins, and oranges from sunny groves in California, Florida, and other southern states where the summers are long. Each fruit grows best in the climate that suits it. When grown in that climate, it tastes best.

With ships and trains to serve him, our grocer is able to sell us fruits from every corner of our land. He sells us fruits

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from other lands as well. In the basket there are dates from date palms that grow on the oases in the distant deserts of Arabia and North Africa. There is a pineapple that may have come from the Hawaiian Islands, far out in the Pacific Ocean. There are bananas, which grow in the countries of Central America and in Colombia, a country in South America.

In these tropical lands that are washed by the waves of the Caribbean Sea bananas used to grow wild in jungles. Of late years men have been clearing away parts of the jungle to raise bananas on plantations. Bananas grow in large bunches, with each banana pointing upward. Before the fruit is fully ripe, the bunches are cut down. Fruit steamers bring the cargoes northward to us.

### **Nuts: Another Plant Food**

Here are nuts: a bag of mixed nuts — walnuts, pecans, filberts, almonds, all of which grow in our country. But what is this? A coconut! Shake it! Hear the milk inside! This nut has come a long way. It may have grown on plantations in the Caribbean lands; or it may have grown on the South Sea Islands, far out in the Pacific Ocean.

Still we are not through with the riches of our basket.

### **Plants Which Flavor Our Drinks**

We open a small can of tea. A short while ago the tea leaves were growing on bushes in China or on the island of Ceylon, south of India.





This Map Will Show You Where Some of Our Foods are Grown

C - Coffee    F - Fruit    S - Sugar    Sp. - Spice    T - Tea

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We open another package and we see coffee beans that may have come from the island of Java, near Ceylon; or they may have come from Brazil, a country in South America where much of the world's coffee is grown.

Another package contains cocoa, and near it there is a bar of chocolate. Cocoa and chocolate do not look like plant foods, but they are both made from the oily beans of the cacao plant, which grows in the tropical lands of South America. These beans grow in pods. In cocoa the oil of the cacao beans is still present. In chocolate the oil has been removed. The cocoa and the chocolate were made from cacao beans in factories in our country.

### Sugar from Cane or Beets

To sweeten our cup of cocoa or chocolate, the grocer has sent us a box of granulated sugar. The white crystals of the sugar may have been made from sugar cane. Sugar cane is a plant that grows in Cuba, an island south of Florida. It also grows in the Hawaiian Islands, in the Philippine Islands, in some of our southern states, and in other warm lands. Cuba raises so much cane sugar that it is sometimes called 'the world's sugar bowl.'

In Cuba, for centuries, men have been clearing jungles for the planting of sugar. In the spring, stalks of cane are cut up and the cuttings are planted. In about a year, the stalks are twelve feet high and bear long green leaves. The light and heat of the sun help these leaves to form a rich sweet sap that flows from the leaves into the fibers of the stalks.

Many plants contain sugar. If we chew blades of grass or flower petals, we can sometimes taste the sugar in them. Sugar cane contains so much sugar that when the stalks are cut down, sprayed with water, and run through large crushing machines, about eighty pounds of sugary sap are secured from every hundred pounds of stalk. The water in the sap is boiled out; and as the sugar cools, it forms molasses and brown crystals. These crystals are 'raw' sugar.

The raw sugar is shipped from the mills near the plantations to sugar refineries in the United States, where, after more boiling and filtering, it forms the little white crystals we eat as granulated sugar. In the sugar refineries these crystals are also made into powdered sugar, lump sugar, or pure brown sugar.

Thus cane sugar comes to our basket to add flavor and fuel value to our meal.

Table sugar is also made from the juice of the sugar beet, which grows in Canada and in our own country in the western states and in the states near the Great Lakes. Many persons like to eat maple sugar. Farmers make maple sugar from the sap of the maple tree. People also use maple sugar in the liquid form of maple syrup to sweeten their wheat cakes.

### Spices

Now what is this, away down at the bottom of our basket? It is a small box of black pepper. We turn the cap so that we can smell the spice. The pungent smell makes us sneeze.

Sailors sailing toward Java, Ceylon, and other islands near



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India are greeted by fragrant winds. The winds blowing from plantations on the islands carry the sweet, sharp scents of pepper, cloves, and other spice plants to the ships at sea.

When the sailors land at the docks near the plantations, cargoes of the spices are brought on board. Some of the ships carry their fragrant burdens back across the Pacific to San Francisco, Seattle, and other cities on the western coast of the United States. Some come through the Panama Canal, a waterway that engineers from our country have cut through Central America. In this way, the ships reach the Caribbean Sea. They can then come north to deliver their cargoes to New Orleans, Galveston, and other cities on the coast of the Gulf of Mexico. Or they can come still farther north to bring their spices to Philadelphia, New York, Boston, and other cities on the Atlantic coast. From the coast cities, trains carry the spices to the inland cities and to the farms.

So the basket from our grocer has many a story packed away in it. Each food plant was raised by workers in the climate that best suited it. Yet, as the boy unpacks the basket, it would seem as though the plantations, the orchards, the groves, the gardens of the world, all lie just outside our door.

### Questions to Answer

1. What were the things that you found in that wonderful basket you have just read about?
2. Where did each kind of fruit come from?

3. Where did the many different kinds of nuts come from?
4. What is the name of the plant that cocoa comes from?
5. What is there in a coconut that is used for food besides the milk?

### Things to Do

1. Find on a map of the world all the places where the many wonderful things came from in the basket of plant foods you read about in this chapter.

2. On an outline map of the world trace with a blue pencil the route traveled by a cargo of bananas coming from Central America to New York City; a cargo coming from Colombia in South America to Boston, Massachusetts.

3. On the same outline map trace with a red pencil the routes traveled by sugar from Cuba to New York City; the route traveled by sugar from the Hawaiian Islands to New York City; from the Philippine Islands to San Francisco in California.

4. Locate on your map the following places: Java, Ceylon, India, the Hawaiian Islands, the Philippine Islands, Colombia in South America, and Cuba.

5. Locate on the same map of the world the American cities to which the many plant foods were sent.

6. Make a collection of pictures of the foods in the basket.

7. Make a collection of pictures of the places where these plant foods were raised.

8. Make a collection of pictures showing how sugar cane is grown and how sugar is made.

9. Find some cans or packages in your pantry containing the foods in the grocer's basket; see whether these packages name any of the countries the foods came from.

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10. If you don't know the meanings of these words, look them up:

filtering	granulated	crystals	refinery
fragrance	hothouse	luscious	plantation

**Find the Best Answer**

Each food plant grows best

- (a) where the climate suits it
- (b) where the soil is best
- (c) where the people live who like to eat it



## *Chapter 16*

### **WATER AND SALT**

We have read of the foods we get from plants. We have read of the foods we get from animals. Now we shall read about salt and water, which are neither plant nor animal. They belong to the mineral department of the earth, which is our storehouse.

#### **Some Uses of Water**

Water helps us in many ways. We use water to bathe in. We use water for cleaning things. We use water to help us fight fire. But the thing for which we most need water is to quench our thirst.

All living things must have water. Without water no plant can live. Without water no animal can live. Without water we cannot live.

Fortunately there is a good deal of water in the world. Three-quarters of the surface of the earth is covered by oceans.

We cannot drink the ocean water directly. It is salty, and when we are thirsty we want to drink fresh water, not salty water.

Yet much of the water that the people of the world drink, and that animals and plants drink, comes from the ocean.

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The roundabout way in which the salty ocean water reaches people as drinking water makes an interesting story.

### The Story of a Cloud

Each day some of the water on the surface of the ocean evaporates or, in other words, changes to vapor and mixes with the air. Water heated in a teakettle changes to vapor and mixes with the air. But water does not have to boil in order to evaporate. The air is like a sponge, soaking up water vapor. Evaporation is going on wherever there is water for the air to soak up. That is why the clothes on the line get dry. That is why the water in a dish placed on our window sill will disappear in a day or two. Air warmed by the sun will soak up more water vapor than cold air. When the moist ocean air rises, much of the vapor which the air has soaked up from the ocean changes to a fine mist. We see this mist as clouds.

Clouds are also formed through the evaporation of the water in fields and forests and inland lakes. But we are following the drop of water in a cloud that rose from the ocean. This cloud is carried on and on by the winds until it reaches a continent, where it drifts over valleys, plains, and mountains.

When a cloud reaches a place where the air is cold, the mist changes to water and falls to the earth as rain. When clouds come to very cold places, like the high mountains, the mist freezes and forms little crystals that fall to the earth as snow.

If we take a cold plate and hold it above the spout of our teakettle, the vapor will change to drops of water as it strikes the plate. In winter the water vapor that is in the air in our warm rooms changes to ice crystals when it strikes the cold window. These facts help us to know how the cold air of the mountains changes cloud mist to rain or snow.

When the rain from clouds falls on the mountains, much of the water sinks into the earth until it reaches a stony bed below. Then the water flows underground until it comes to some rocky place that blocks its course. Here it comes bubbling up through the earth as a spring.

Some of the winter snow that falls on the hills and mountains is melted by the warm spring sun. Much of this water and also much rain water rolls down the sides of the hills and mountains in gurgling brooks.

On their way downward, many small brooks meet and flow on together as larger brooks. Larger brooks meet and flow on together as rivers. Some of these rivers flow into inland lakes. Other rivers flow on and on through valleys and across plains until they come to the end of land, where the water flows back into the ocean.

In all countries where the climate is not too cold, the water from the clouds, flowing through the land as rivers, helps plants to grow. There are some places, like the deserts, where it seldom rains and there are no rivers. Only plants that need little moisture can grow on the dry desert sands. Two such plants are the cactus and the sagebrush,



which grow on the American desert in the southwestern part of the United States.

Today men are trying to turn a portion of this desert into farm land by digging ditches that will lead water from distant lakes and rivers into the hot dry sands. This way of bringing water to help in farming is called *irrigation*.



Irrigation Makes Farm Land of the Desert

Besides helping plants to grow, the water making its voyage in a cloud gives drink to man and beast. People who live in wild country get water from springs and brooks and rivers. In some countries, water boys riding donkeys fill small bags with drinking water from the springs. Then they go into the cities, where thirsty people pay them for a drink. In our country, a farmer who lives where there is no spring near the house must dig into the earth until he strikes water. This water is rain that has trickled down through the soil

from distant hills to the rocks below. So the farmer gets his well. From this well he draws up the water with a pump. He may run the pump by a windmill or a gasoline motor.

### Bringing Water to the Cities

In the cities there are not enough springs to give every one water. There are no wells outside the houses. Yet many times every day those of us who live in cities turn on faucets, and the water flows, as if by magic. It took much labor and much thought to bring us the water that flows so easily. In some cities the water comes from the rain that fell on the hills and mountains miles away. To bring this water to these cities, engineers have built great reservoirs into which they have led the water from the surrounding hills and mountains. These reservoirs are really artificial lakes that the engineers themselves have helped to form. Miles and miles of huge pipes lead the water from the reservoirs down to these cities.

All through a city and underneath the city streets there are water pipes through which the water from the reservoir flows into people's houses. Branch pipes lead this water from the main pipes in the streets into the cellars of houses. Pipes inside the houses lead the water from the cellars to the rooms above. The water supply is owned by the city. The owners of the houses pay the water department for the use of the water. This department uses the money to keep up the supply of water.

What a long voyage the drop of sea water that we saw



started on its way has had to make from its home in the ocean, through its windswept journey in a cloud to the mountain where it fell as rain or snow, down the mountain side



### Bringing Water to Your Drinking Glass in the City

into the reservoir, through the pipes, into your drinking glass!

But why is it that this glass of water does not taste salty? The water was salty when it was in the ocean. Why is it not salty now?

The answer is simple.

### How Salt Got into the Ocean

When the sun shone down on the ocean and the water rose in a vapor to form mist and clouds, the salt did not rise with the water; it was left behind in the ocean. But this



answer only raises another question. How did the salt get into the ocean?

To begin with, we must remember that salt is a mineral that is part of the earth. There are places where rocks of salt lie on the surface of the earth. These places are called *salt licks*, because animals come to them to lick the salt that they need for food. But apart from these salt licks, there are small quantities of salt in much of the soil.

The rivers that come flowing through the land tear away much soil from the mountain sides and the river banks along their way. The rivers carry some of this soil and the minerals that it contains into the lakes and oceans. In this way the rivers have carried so much salt into the oceans that the ocean water has become salty.

In the United States there is a lake called the Great Salt Lake that is even saltier than the ocean. The Great Salt Lake is a shut-in lake, and the salt brought into it stays there as it stays in the ocean.

### How Salt Reaches Our Tables

Our bodies need salt. There is salt in a few of the plants and in the meat that we eat, but there is not enough salt in these foods for our bodies. So workers get salt for us directly from the earth or from salt water.

One way in which salt is made for us is by evaporation. Salt water from salt lakes or from the ocean is run into huge basins, where it stands until all the water has passed off as vapor. This leaves a layer of salt. In many countries salt

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is obtained in this way from the ocean water. In the United States much salt is made by evaporating water from Great Salt Lake.

Salt is also pumped up from salt wells. In places where the earth has stored up much salt, men dig wells and pump water down into the salt. Then they pump the water up again. When the water comes up, it is so salty that a gallon of water may hold two pounds of salt. This salty water is called *brine*. Evaporating the brine leaves the salt.

A third way of getting salt is by mining. When salt is dry, it forms crystals. We see small crystals in the table salt we use, but there are mines under the earth where salt is found in huge crystals that look like rocks. In a few places where men have found large deposits of rock salt underground, they have sunk shafts into the earth. In a salt mine, miners go down the shaft to chop the salt out in chunks. Then they load the rock salt on wagons that run along tracks in the mine to the shaft. Up the shaft goes the salt. From the mine the salt is taken to a near-by refinery, where it is made ready for our tables.

### Questions to Answer

1. What happens to water when exposed to the air?
2. What happens to the moisture in the clothes hanging on the clothesline?
3. How are clouds formed?
4. What are three ways of getting salt?

### Things to Do

1. Fill a shallow dish with water and put it on the window sill in your classroom. Watch it from day to day to see what happens to it.

2. Watch the puddles of water in your yard after a rainy day. Report to your class what happens to them. Tell what this process is called.

3. Keep a record of the time it takes for similar puddles to disappear on a cloudy day and on a sunshiny day.

4. See if you can find out where the salt that you buy from your grocer came from.

5. See if some one can bring to the class a piece of rock salt.

6. Find out where the water that you get from your faucet at home comes from.

7. Be sure you know what these words mean:

quench

reservoir

brine

evaporate

artificial

mist

engineers

chunk

irrigation



A Desert — How Would Irrigation Help?



## PART IV

### *CLOTHING THE WORLD*

#### CHAPTER

17. The Clothes We Wear
18. Clothing from Animals: Furs and Leather
19. Clothing from Animals: Wool and Silk
20. Clothing from Plants: Cotton, Linen, Rubber



## *Chapter 17*

### **THE CLOTHES WE WEAR**

Birds have feathers to protect their bodies against heat and cold. Fish are covered with scales. Many animals have thick hides or they have coats of fur or wool. Man alone of all the animals has to make clothes to keep his body from becoming either too hot or too cold.

#### **Warm Clothes for Cold Countries:**

##### **Wool, Leather, Fur**

In the cold Arctic countries people wear furs all the year round. In temperate countries like our own, where the winters are not so cold, people wear wool and leather as well as fur. These clothes we get from animals.

Long ago hunters learned how to get furs and leather from animals; long ago farmers learned how to spin thread and weave cloth from the wool that grew on the backs of their sheep.

#### **Cool Clothes for Warm Countries: Cotton and Linen**

In the tropical jungles the weather is so warm that people do not need fur or wool. The jungle dwellers have no cold winds or snow to chill them, but because the climate is hot, they have to be careful that they do not become overheated.



They go about almost naked and rub vegetable oils on their bodies, so that the heat will not make their skins too dry. Such little clothing as they do wear, they make from plants, either from cool wild grasses or from leaves.

India is a warm country. A great part of India is in the tropics. Many of the people live in jungles. In India there are also farms and cities. Long ago the farmers in India learned to make a cool cloth from the fibers of a plant called the cotton plant. They got threads from the cotton fibers and wove these threads into cotton cloth. This cotton cloth was cool; it was also strong, much stronger than the clothing that the jungle people made of grasses and leaves. It is believed that India was the first country to raise cotton for cloth. The cotton plant was brought from India to our country more than two hundred years ago.

Another strong cool cloth that people in warm countries learned to make from plants is linen. Even before the people of India learned how to weave cotton cloth, the farmers in Egypt knew how to make linen cloth from the flax plant. They raised flax along the banks of the Nile, and they spun linen thread from the fibers in the stalks of the plant. Long ago the people of Ireland learned how to grow flax and how to weave linen. Today Ireland is famous for its fine linen cloth.

### Silk

Furs, leather, and wool are warm and protect our bodies against wintry cold. Cotton and linen are cool and protect

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our bodies against summer heat. There is another clothing material that is both cool in summer and warm in winter. This is silk. Silk was first made by the Chinese more than four thousand years ago.

Silk cloth comes from a little caterpillar called the *silk-worm* that feeds on the leaves of the mulberry tree. You may have raised silkworms in your school. How the Chinese learned to use these worms for making silk, we shall read later.

Today in our own country we wear furs and leather as did the hunters of old. We wear clothes made of wool. We wear linen clothes as the Egyptians did. We wear cotton clothes as the people of India do. We wear silk clothes as the Chinese do.

### Indian Clothes

But the Indians who lived in this country before the white men came did not wear silk or wool or cotton or linen. They could not wear wool, because they had no sheep. They could not wear cotton or linen, because they did not raise cotton or flax plants; nor did they know how to raise silkworms and make silk cloth. Being without wool, cotton, linen, or silk, the Indians wore furs. They also wore leather clothes made from deerskin and buffalo hides.

When the white people came to this country, they brought woolen clothes with them. They learned from the Indians to wear deerskin. But they wanted to dress, if they could, the way they had dressed in the countries of Europe from which they came.



This Map Shows Where the Materials Used in Our Clothing Come From

C-Cotton    L-Leather    R-Rubber    S-Silk    W-Wool    Flax    Furs



### How Cotton, Linen, Wool, and Silk Came to America

As the newcomers did not want to keep on buying all their clothes from the weavers in Europe, they brought sheep across the ocean and made their own woolen clothes. They brought over flaxseed, planted flax, and made their own linen. After a time some of the farmers in the southern part of this country planted cotton, from which cotton clothes could be made.

Then there came a time when ships built in the United States began to go on long voyages to China. When they returned, these ships brought back silk cloth to sell in this country. Today the United States imports raw silk, and much silk cloth is made here.

Now we know why we can wear wool and cotton and linen and silk in this country where the Indians had only animal skins for their clothes. This does not mean that the Indians did not know how to weave. They practiced weaving with different kinds of grasses long before cotton, wool, or silk were known in this country. Indian tribes living in those parts of the country that are now Arizona, New Mexico, Nevada, southern Colorado, Utah, and western Texas made excellent coiled basketry, woven sandals, and bags of woven twine hundreds of years before Columbus discovered America.

#### Things to Do

1. Make a collection of cotton, wool, linen, and silk materials used for clothing.

2. Plant some cotton seeds and some flaxseed in your window box or flower pot.

3. Study the map of the world; locate the places mentioned in this chapter where linen clothing was first worn; where silk clothing was first worn; where furs were worn.

4. Print on your own outline map of the world with a colored pencil the names of these places.

5. Ask your teacher to help you raise some silkworms in your classroom. If you feed them and watch them grow, you will see some very interesting things happen.

6. Make a collection of pictures showing the raw materials from which we get all the kinds of clothing mentioned in this chapter.

7. You have read in this chapter about people clothed differently from us; collect pictures of these people in their native dress.

8. Ask your teacher if she will help you weave a mat of raffia, which is a kind of grass used by American Indians for weaving mats and baskets. Perhaps you could weave a simple basket.

## *Chapter 18*

### **CLOTHING FROM ANIMALS: FURS AND LEATHER**

Long ago cave-dwelling hunters hunted in the wild forests for furs. Today, far away in the cold north countries, hunters still spend their lives hunting for the furs that men and women wear.

The animals that yield the best furs live where the winters are long and severe. The Arctic seal and the bear are fur-bearing animals. In Canada and in other lands, not so far north as the Arctic countries, live the otter, the beaver, the marten, the mink, and the fox. Their furs are thickest and best during the cold winter months.

Years ago there were many fur-bearing animals in our country, and men hunted and set fur traps in the forests that covered a great part of our land. Now that many of our forests are gone, we have to get most of our furs from Canada, from the coast of Alaska, and from Russia.

#### **The Life of the Fur-Trapper**

The life of the Canadian fur-trapper is a lonely one. Bearing his traps on his back, he sets out each day from his little log cabin in the snow-covered forest. His broad snow-shoes keep him from sinking too deeply into the snow. If no other trappers have made a path through the forest,



he uses his ax to chop out a mark in some of the trees he passes. Whenever he sees the tracks of a beaver, a mink, an otter, or a fox in the snow, he stops to set one of his metal traps. Before dark, he returns; the ax marks in the trees guide him back to his cabin.

The next day he gathers the animals that his traps have caught for him. He resets the traps and, with pack loaded, returns to his cabin.

Here, stripping the skins from the animals, he stretches the skins on wooden frames to dry.

So the trapper lives for months, far from the comforts of farm and town. His food is wild meat and canned goods. His companions are the birds and the trees. His music is the music of the forest winds blowing through the tall trees. As he looks out from his cabin door, he sees frozen streams in the valleys below and mountains raising their ice-covered summits to the chill blue sky above.

When spring comes and the rivers thaw, he loads his dried furs in his canoe and paddles to the nearest trading post some hundreds of miles away. At the trading post the trapper sells his furs. After a time he paddles his canoe back to his cabin, to mend his traps for the following winter.

The trader who has bought the furs sends them to the countries where they will be worn. Many of the Canadian furs are sold to the United States. In a few large cities in our country skillful furriers carefully clean the furs, dye them, and make them into scarfs, muffs, coats, and trimmings for suits and dresses.

How many people who wear furs ever think of the lonely trapper in his little log cabin in Canada, of the men who hunt seals on the Alaskan islands, of the men who set their traps in the forests of Russia?

Within the last few years men have found it possible to raise some animals for their furs instead of hunting or trapping the animals in the forests and streams. Foxes and muskrats are raised in this way, and the places where they are raised are spoken of as *fur farms*, just as the places where cows are raised for their milk are called milk farms, or dairy farms.

### How We Get Leather: Tanning Hides and Skins

As a matter of fact, the cow, like the goat and the sheep, also helps to clothe us by furnishing us with leather. Our leather shoes, our leather gloves, our leather belts, come from the skins or hides of cows, sheep, and goats. The skins and hides of other animals, like horses, pigs, and kangaroos, and even snakes and lizards, are also used in making leather.

For thousands of years men knew how to make leather. First they scraped the flesh and hair from the hides. Then they laid the hides in vats filled with shavings of oak bark. They poured water over hides and bark. For six months the tannic acid in the oak bark soaked through the pores of the hides, toughening the animal skins so that they would wear well. This long soaking is called *tanning*. A tanned hide is called *leather*.

Today leather is still made in very much the same way,

except that the tanners now use many machines in place of hand tools and get tannic acid from other plants besides the oak tree.

Each year the American tanners buy millions of skins and hides from the meat packers in our country. They buy skins and hides from the sheep and cattle ranchers of Argentina, in South America, from South Africa, from China, and from Europe.

In the tanneries of today millions of hides are made into leather each year. Soaking the hides in a lime bath for days loosens the outside hair. A hand scraper removes the flesh from the inside of the hides. Because oak is now scarce, tanners use the bark of the hemlock and chestnut tree. The bark of these trees contains tannic acid. The tanners also import tannic acids that are obtained from plants growing in South America, Asia, Africa, and Europe. These acids are boiled out of the plants in the countries where the plants grow and are then shipped to our tanners in liquid form.

The tanners soak the hides in the tanning acids for at least three months. Sometimes hides are soaked for nine months before the leather is ready to be made into the many articles we use, but other kinds of leather are made much more quickly than that.

### Many Uses of Leather

When the leather is finished, it is used for many purposes. It may be made into gloves, valises, suitcases, straps, or harnesses. It may be used as upholstery, either for auto-



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mobiles or for furniture. Much leather is used for machine belts that help to drive the wheels of factory engines. But the greater part of the leather from the tanneries goes into the making of shoes.

### Leather: the Chief Shoe Material

In many foreign countries people used to wear shoes quite different from those worn in America. In Holland, France, and Sweden wooden shoes were worn and are still worn by some persons. In China and Japan people wore straw sandals, and in fact many still do. But there is so much traveling in these days and so much mingling together of all peoples of the world that customs in dress are rapidly changing, and people in all countries are beginning to dress more or less alike.

In these days leather shoes are worn the world over, except as fashions in shoes change to some other material. Shoes made of fabrics, such as satin, fancy silk, and velvet, are sometimes worn by women for dressy wear.

Canvas and rubber shoes are worn by persons who play tennis or other light outdoor games. But for everyday wear, leather shoes are the most serviceable, and that is why leather is one of the important materials in the making of our clothes.

### Making Shoes: the Old Way and the New

In the days of our grandparents, the man who mended shoes made shoes as well. He made shoes by hand with the

aid of a few hand tools. But today shoes are made in cities where there are large shoe factories run by machines. Many of these factories are found in the cities of New England. There are very large shoe factories in other parts of our country.

In these shoe factories the work is divided. One machine cuts the leather for the upper part of the shoe; another punches the buttonholes; another shapes the soles and sews the upper parts to the soles. Each machine does some one part of the work. The man who tends the machine has only to guide it at its special task. Finally all the parts are put together, and the shoes are finished.

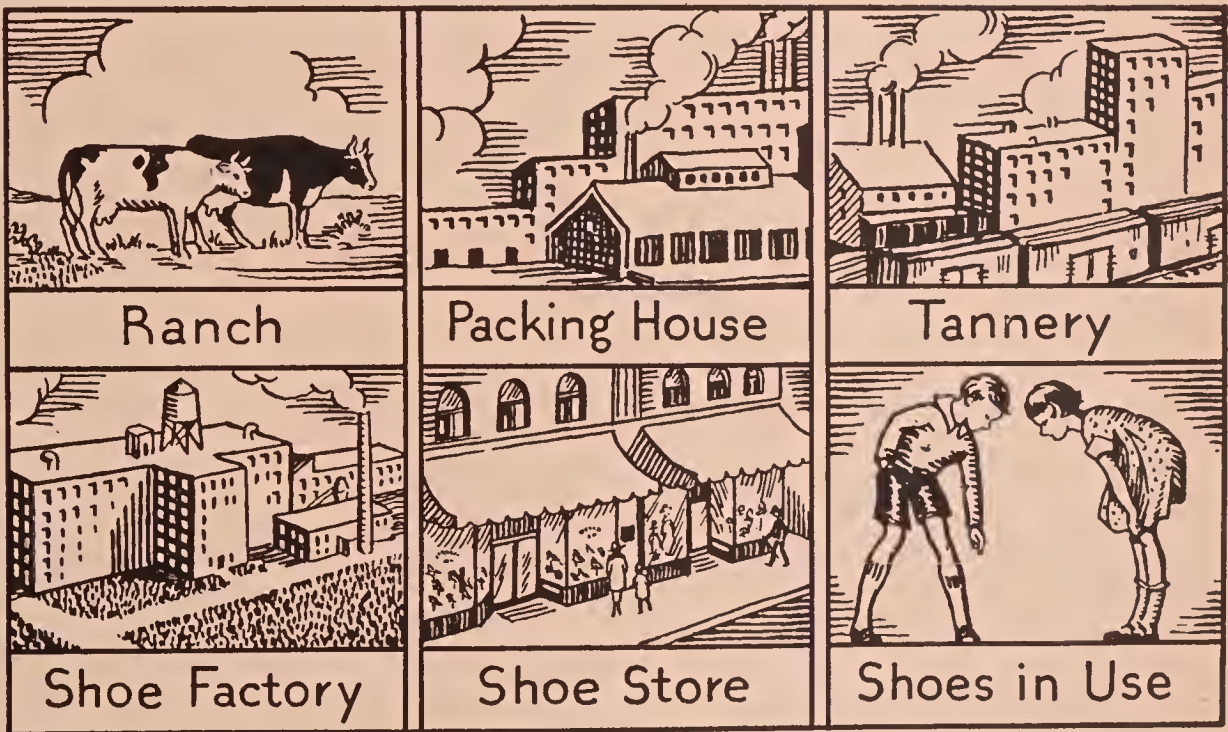
### The Travels of a Pair of Shoes

Our shoes can carry us many a mile. But what long journeys had to be made before we could have our shoes! The herds that furnished the leather in your pair of shoes may have grazed either on the southwestern plains or in the corn belt of our own country; they may have spent their lives on the plains of Argentina. Boats or trains had to carry the animals to meat-packing cities, and the hides to tanneries. Carloads and shiploads of oak, hemlock, and chestnut had to be sent to the tanneries. Ocean ships had to bring tannic acid from far corners of the earth. After the leather was tanned, it had to be sent to the shoe factories.

Yet the travels of your pair of shoes were not over. There was still the journey by railroad, steamship, or automobile truck to the store from which you bought them.

Now that you have them on your feet, you will walk many miles in your home, along country roads, or on city streets.

Looking down at your shoes, you will remember the traveling they did before they reached you. They will re-



The Travels of a Pair of Shoes

mind you how the whole world must work together to provide the things we need.

### Questions to Answer

1. What are the most important fur-bearing animals?
2. How are the different kinds of fur-bearing animals caught?
3. Where do we get our leather clothing? What articles of clothing can you name that are made of leather?
4. How has the making of shoes changed since our great-grandfather's day?
5. Why do the children in some places wear wooden shoes instead of leather ones?



### Things to Do

1. Locate on your outline map the places all over the world where fur-bearing animals live.
2. Locate on the same map the countries from which we buy leather.
3. Locate the countries where cotton is grown; where silk-worms are cultivated; where sheep are raised; and where flax is grown.
4. Make a list of the kinds of clothing made of leather, of silk, of cotton, of wool, and of linen.
5. Although this chapter doesn't tell you, see whether you can find out where your own shoes were made.
6. If you live near a shoe factory, plan a visit to see how shoes are made; then write the story of your visit in your notebooks.
7. Study the words in the list below. If you are not sure of the meaning of each word, read the paragraph in which you found it; then see if you cannot decide what it means.

trapper

companion

scraper

factory

vat

upholstery

tannic acid

tanneries

fabric

muskrat

picturesque

fashionable

serviceable

stripping

furrier

## *Chapter 19*

### CLOTHING FROM ANIMALS: WOOL AND SILK

All of us who live where the winters are cold wear woolen clothing. Our sweaters are made of wool; we have woolen suits and woolen overcoats, woolen stockings, woolen underclothes.

Some of our wool comes from sheep raised on small farms in the eastern and middle states of our country. Some wool



Growing Coats of Wool

comes from the sheep ranches in the Southwest. We get great quantities of wool from sheep raised in the Rocky Mountains and in the mountainous states on the Pacific coast. We even import wool from Australia, Argentina, and other countries.

### Grazing Sheep Grow Coats of Wool

In the western states of our country, all through the winter millions of sheep graze in the valleys. When summer comes, the sheep-herders lead their sheep up into the mountains.

The office of the sheep-herder is a little wagon on wheels. Here he keeps his tools, his food supplies, and his extra clothing. Here, when it rains, he and his shepherd dogs find shelter. At other times the herder sleeps under the open sky, rolled up in his blanket.

His dogs help the herder round up the sheep, but try as they will to keep the sheep together, some wander off and get lost. Whenever the bleating of lost sheep is heard, the herder and his dogs go out to bring them in.

Each day the herder leads his sheep higher and higher, up toward the timber line, beyond which it is too cold for trees to grow. In the summer wild grass does grow in these high places, on mountain plains that are called *plateaus*. Day by day the sheep graze here; and as they graze, they grow their woolen coats to protect them against the coming winter.

When autumn comes and the mountain grass is gone, the herder leads his sheep down into the valleys. In the spring the shearers clip off the sheep's wool.

So men have been shearing sheep ever since the farmers of long ago first learned to make yarn and woolen cloth from wool.



### How Woolen Cloth Is Made

Just how men learned the art of weaving, we do not know; but they did learn that the wool from their sheep could be spun into long threads, called *yarn*, and that this yarn could then be woven into cloth. Many believe that women were the first spinners and weavers.

The weaving of cloth was done in former days on a hand loom, a wooden frame on which many threads were arranged in parallel lines lengthwise. Then other threads were drawn sidewise over and under the lengthwise threads. The side-wise threads were drawn through the other threads by a tool called a *shuttle*.

Whether wool was first woven by the Egyptians or the Greeks is uncertain, but it is known that the sheep has been a domestic animal from prehistoric times, for its bones have been found with those of human beings in ancient tombs.

There are some parts of the world where people still spin woolen thread or yarn by hand or on small spinning wheels that draw out one thread at a time. They still weave woolen cloth on hand looms.

In our country the wool from the sheep ranches is sent in bags to woolen mills, where great machines made of iron and steel spin the yarn and weave the cloth.

In the woolen mills, machines first scour the wool. Often, after the scouring, the wool is dipped into tanks of dye to give it whatever color is desired. Then the wool passes through carding machines. These machines have rollers armed with

teeth that pull at the fibers in the wool to separate them. The carded wool is combed by combing machines, which remove the shorter fibers.

Now the wool is ready for the spinning machine. The spinning machine has several hundred spindles on a single iron frame. These spindles draw out the thread or yarn, which is wound up on spools.

Then comes the weaving of the cloth. After the lengthwise threads have been arranged, the power loom weaves the



A Factory Built near Water Power

wool almost without the touch of human hand. As the shuttle flies back and forth, the lengthwise threads are raised and lowered, to make plaids, stripes, herringbone, or other patterns.

You would need to visit a woolen mill, probably, to understand clearly just how scouring, dyeing, carding, combing, spinning, and weaving are done, but you can at least understand now that to make woolen cloth, men have to know how to make and to run many different machines.

In this country, there are many woolen mills in New Eng-



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land, where rivers help furnish power for all this machinery. There are also woolen mills on the Pacific coast and in the southern states, close to the herds of sheep that graze on the mountain plains. England, too, has many woolen mills.

Almost all of us wear clothing made of wool. As our country does not produce enough wool for our clothes, we import wool from other sheep-raising lands, such as Australia, and Argentina in South America.

### Ready-Made Clothes

Most of our woolen clothing is made in clothing factories in New York, Rochester, Chicago, and a few other large cities. In these clothing factories there are, again, many machines. Machines cut the woolen cloth; machines sew the goods; and machines press the goods.

The most useful of these machines in the clothing factory is the sewing machine. Until this machine was invented, people all over the world sewed clothes by hand. Stitch, stitch, stitch, tailors and dressmakers sewed for hours each day, and the dresses and suits that people wore were all handmade. Most often they were made to order for the man or woman, boy or girl, who was to wear them.

Your great-grandmother probably made all the clothes for her children by hand, for she could not go to the store and buy them ready-made as your mother can. Then, about the year 1846, Elias Howe, an American, invented a sewing machine that worked a needle much faster than fingers could stitch. This was a great help to tailors and



dressmakers, especially after the foot treadle was added in place of the wheel turned by the hand.

Today in the clothing factories, sewing machines using steam or electric power can make hundreds of stitches each minute and turn out more garments in a day than the hand sewers could turn out in a month. For this reason most people today wear 'ready-made' clothes, or, in other words, clothing made in factories. These ready-made clothes come in many different sizes to fit persons who are short or tall, slim or stout.

### The Worm That Helps to Clothe Us

Now that we have seen how woolen cloth is made, we shall find it easy to understand the making of silk cloth.

We have seen how the sheep, eating grass, turns part of its food into a woolen overcoat. In much the same way a little worm called the *silkworm*, eating mulberry leaves, turns part of its food into a fine sticky substance that it stores up in two sacs, one on each side of its head.

When the silkworm is one month old, it draws this substance out of its head in two fine threads and winds these threads around its body.

When the body of the silkworm is covered with the threads, we call it a *cocoon*. If the cocoon is left to itself, the silkworm inside gradually changes, until after a time it breaks open the cocoon and comes out as a moth. But long ago the Chinese decided not to let all the cocoons change to moths. They learned that if they soaked a cocoon in hot water,

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they could uncoil the fine threads that the silkworm had spun around itself. This thread is called *raw silk*. By twisting the threads of several cocoons together as they uncoiled them, the Chinese obtained a thread strong enough to weave into a cloth on their hand looms.

How the Chinese learned to use these worms for making silk is an interesting story, though no one knows how true it is. A Chinese empress with the lovely name of Lady of Si-Ling-Shi encouraged the people of China to grow the mulberry tree. She took care of silkworms herself. She invented the loom for weaving silk into cloth. The people of China were so proud of her that they made her a goddess. They still worship her as the Goddess of Silkworms. Every year the Chinese people have a festival in her honor. One of the ceremonies of this festival is the feeding of silkworms.

A curious story is also told about how India learned to make silk. A Chinese princess is believed to have carried into India the eggs of the insect, or moth, and the seed of the mulberry tree, hidden in the lining of her headdress.

Today silkworms are raised in Japan, China, France, Spain, and Italy. In all these lands, mulberry trees are raised. People feed leaves to the worms and care for them until the cocoons are ready. Some of the silk spun from the cocoons is woven into cloth in these same lands; the remainder is shipped to other countries as raw silk. Within the last hundred years, ways have been found to spin and weave silk by machinery.

The United States imports silk cloth from China and

Japan. It also imports raw silk, which is woven into cloth in factories in this country.

### Rayon: Man-Made Silk

There is another kind of silk called *artificial silk*, or *fiber silk*. This silk is made from wood pulp and the fibers of certain plants. Half a century ago, a Frenchman discovered how to make an artificial silk that is now commonly called *rayon*. Rayon is now made in the United States as well as in other countries. The rayon thread can be woven by itself into the cloth called rayon, or it can be mixed with wool, cotton, or pure silk. Rayon is less costly than pure silk and for this reason large quantities of it are used today in the making of clothing.

### A Test to Try

Write these sentences in your notebook. Add in each blank the missing word or words that make the statement correct.

1. Sheep raising is carried on in the \_\_\_\_\_ part of our country.
2. The weaving of cloth is done upon a \_\_\_\_\_.
3. Woolen cloth is not often woven by \_\_\_\_\_ today.
4. There are many woolen mills in the \_\_\_\_\_ section of the United States. This section is called \_\_\_\_\_.
5. The United States imports wool from \_\_\_\_\_ and \_\_\_\_\_.
6. The first sewing machine was invented by \_\_\_\_\_ in the year \_\_\_\_\_.
7. The \_\_\_\_\_ were the first people to learn the art of silk weaving.
8. The United States imports silk from \_\_\_\_\_ and \_\_\_\_\_.
9. A \_\_\_\_\_ discovered how to make artificial silk.



Things to Do

- 1. Draw pictures of a sheep-herder with his sheep and his shepherd dogs.
- 2. Locate on your maps the countries and cities mentioned in this chapter.
- 3. Write the name of a product for which each place is noted.
- 4. Draw on this map a dotted line with your blue pencil showing the trade routes over which wool and silk are shipped.
- 5. Be very sure you know the meanings of the following words and phrases:

artificial silk	loom	prehistoric times	festival
plateaus	shuttle	domestic animals	cocoon
spinning	scour	ancient tombs	mulberry
weaving	shearing	combing machine	raw silk
parallel	graze	herringbone	ceremony

6. In the first column below each word is connected in meaning with some word in the second column. Copy these columns in your notebook, writing on the same line the two words that are connected in meaning.

1. artificial silk	sheep
2. silkworm	Elias Howe
3. shearing	Chinese empress
4. sewing machine	China
5. silk weaving	Australia
6. wool	rayon

## Chapter 20

### CLOTHING FROM PLANTS: COTTON, LINEN, RUBBER

A girl is getting ready to go to school on a warm, rainy morning. She is wearing a cotton dress, with linen cuffs and a linen collar. She is putting on her rubber overshoes. Before leaving home, she will put on her rubber raincoat.

To provide the girl with her dress, her overshoes, and raincoat, the cotton plant, the flax plant, and the rubber tree had to take root in the earth.

#### Cotton: the Cloth Made from Fluffy Seeds

The plant on which cotton grows needs a warm climate and well-watered soil. In our country there are cotton plantations in almost all the southern states from the Atlantic coast to Texas. This region is called the *cotton belt*.

In the spring the cotton seed is planted. By summer the cotton bushes blossom. As the bright blossoms fall, small seed pods appear in their places. All through the summer the seed pods grow until they become large *bolls*, as they are called. When these bolls burst open, we can see that each one is filled with a fluffy mass of hairlike fibers wrapped around the small seeds as if to keep them warm. These white balls of fiber are cotton.

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In harvest time field workers pick the cotton from the bolls. These cotton-pickers must be careful not to get either leaves or boll shells in with the cotton.

Wagons carry the picked cotton from the fields to the gins where the seeds are removed. In the cotton gins, revolving metal combs remove the seeds. The cotton gin was invented in 1793 by an American named Eli Whitney. Before the cotton gin was invented, men used to remove the seed by hand, and they could clean about one pound of cotton in an hour. Whitney's cotton gin could clean two hundred pounds in an hour.

After the seeds have been removed, great machines press the cotton into five-hundred-pound bales. Wagons haul the bales to railway stations or to river docks. Ships and trains then carry the bales on their way to the cotton mills where cotton cloth is made. Much of the cotton is shipped to mills in New England where waterfalls furnish power for the spinning and weaving machines. New England was once the center of cotton weaving, but during the past fifteen years men have built many cotton mills near waterfalls in the states that lie in the cotton belt. The cotton-planters send much of their cotton to these mills, which are nearer to them than the mills in New England.

### Making Cotton Cloth

In the mills the great bales of cotton are first put into machines that pull the closely packed cotton apart and deliver it in small tufts to a moving belt. This belt carries



the cotton to other machines that clean the fibers and prepare them for the spinning machines.

The spinning machines draw out the fibers and twist them into long threads, called *yarn*. This yarn is used for weaving cotton cloth. If we untwist the thread on a spool of cotton, we can easily see the fibers of which it was made, but cotton thread for sewing is finished with a harder surface than cotton yarn for weaving.

The power looms that weave the threads into cotton cloth are much like the looms that weave woolen cloth. The machines work as if by magic. The shuttles carry the sidewise threads over and under the lengthwise threads in any order that the cloth-maker desires, to weave cloth of different patterns.

The cotton cloth is then bleached until it is pure white. If colored cloth is wanted, the cloth is dyed in vats. If colored patterns are desired, they can be either printed on the cloth by printing presses or woven into the cloth from dyed thread.

Long ago the Chinese learned how to print patterns from carved wooden blocks filled in with colors. Today the patterns are put on copper rollers. As the printing presses run, the rollers dip into a well of color. A knife scrapes the color off the raised, smooth part of the roller. The roller presses down on the cloth and prints the colored pattern where the color has not been scraped off.

The cotton dress that the girl is wearing may have been made for her by her mother, but most of the cotton dresses

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and other cotton clothing that people wear today are made in clothing factories.

### Linen: the Cloth Made from Plant Stalks

The story of linen is much like the story of cotton, except that linen thread is made from fibers in the stalks of the flax plant.

The flax plant needs a cooler climate than the cotton plant. It needs plenty of rain. Good flax is raised in Belgium, Holland, and Ireland. Russia has great flax fields. The United States raises flax, too, but our flax is raised for the seed. Flaxseed is used in making linseed oil for mixing paints.

Flaxseed is planted in the spring. By June the fields of flax are covered with sky-blue flowers. In the early autumn, when the plants have borne seed for next year's crop, men pull up the flax stalks, which are about three feet high, and tie them in bundles.

If we examine the stems of almost any flowers, we can see fine fibers running through them. We notice that the outer fibers are coarse and woody.

The stalks of the flax also have fine and coarse fibers mixed. Linen is made from the fine fibers in the flax stalks.

To remove the fine fibers, the bundles of stalks are lowered into streams and kept in water until they begin to rot. After the stalks have rotted, the bundles are taken from the streams and laid out to dry. Then machinery breaks up the stalks and removes the heavy wooden fibers.

The fine fibers are now prepared so that spinners can draw threads from them for weaving linen.

Until about one hundred years ago, most linen was spun and woven by hand in the homes of spinners and weavers. Today most of the spinning of linen thread and the weaving of linen cloth is done in factories by machines; linen clothes are also made by machines in factories.

Now we see how the girl who was getting ready for school got her linen cuffs and her linen collar.

### **Rubber: the Juice of a Tree That Helps to Clothe Us**

The rubber overshoes and the rubber raincoat the girl is wearing are made from a liquid that oozes out of the bark of certain trees. The rubber tree grows best in tropical countries or in countries that are nearly as warm as the tropics. We import nearly all our rubber.

For a long time almost all the rubber that people used was obtained from jungles along the Amazon River in Brazil. Lately, rubber companies have been clearing jungles in the islands near India. They have planted many square miles of rubber trees, and today these plantations supply a large portion of the world's rubber.

To obtain rubber from the rubber tree, men cut slits into the bark and they place cups to catch the sticky, white juice that flows from the wounds. This is called tapping the trees. It makes you think of tapping trees for maple syrup. In the Amazon jungles the Indians of South America do this



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work. The men tap many trees each morning. Then they go over their ground to gather the cups. The jungle rubber is smoked and hardened over fires, so that it can be shipped in lumps or balls.

Most plantation rubber is shipped in large sheets. Boats bring great cargoes of rubber to the factories in our country.

In the Amazon jungles the season for gathering rubber begins as soon as the floods of the Amazon River are over. This is usually about the first of August. The natives leave their primitive homes, often traveling hundreds of miles into the forest lowlands. There, within easy reach of the rubber trees, they set up their camps. They build huts out of poles covered with palm thatch, and here they live in little colonies while the rubber harvest is going on. It takes about six months (from August to January or February) to harvest the rubber crop.

People did not always know how to use rubber for clothes. When white people first came to Central America and South America, they saw the Indians playing with balls made of rubber. After a time some men noticed that this material sheds water. But for a long time rubber was used for little more than erasers. This continued to be true until Charles Goodyear, an American inventor, who had been experimenting with rubber, made an important discovery. He learned by accident that rubber and sulphur, heated together, would not become stiff in cold weather and would not become soft and sticky in warm weather. Many uses were





Tapping Trees on a Rubber Plantation



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soon found for this prepared mixture of rubber and sulphur, which is called *vulcanized rubber*.

Today rubber is used in making automobile tires, machine belting, garden hose, and the hose with which firemen fight fires. Rubber parts are used in many tools and engines. Because rubber sheds rain, rubber is used to make shoes and coats to be worn on rainy days. Rubber shoes and coats are made in factories by machinery.

Now we know how the girl we described at the beginning of the chapter got her overshoes and her raincoat.

### Things to Do

1. Locate on the outline map of the world, the countries in which flax is raised. Write the word flax near the name of the country on your own map.

2. Do the same thing with cotton; with rubber.

3. Make a list of all the things you can think of made of rubber; see how many of them you can get together for a collection.

4. Sometimes the name of a kind of cloth tells where it was first made. Try to find out where calico and damask were first made.

5. Make a collection of different kinds of linen and cotton goods.

6. If you arrange all the samples of materials that you bring to class on charts, you will have a very interesting exhibit. Your exhibit will be even more interesting if you write short compositions telling what you know about these samples. Some of the important facts you might write about are: the raw materials from which they are made; where they are found; what kinds of useful articles they are made into.



7. You might collect pictures of the different peoples of the world who are engaged in cultivating cotton, flax, and rubber.

8. Find out what linseed oil looks like; what it is made from; what it is used for; how much it costs.

9. Check up to be sure that you know the meaning of these words: *import*, *ooze*, *primitive*, *thatch*; also that you know the difference between *ball*, *boll*, and *bale*.

## PART V

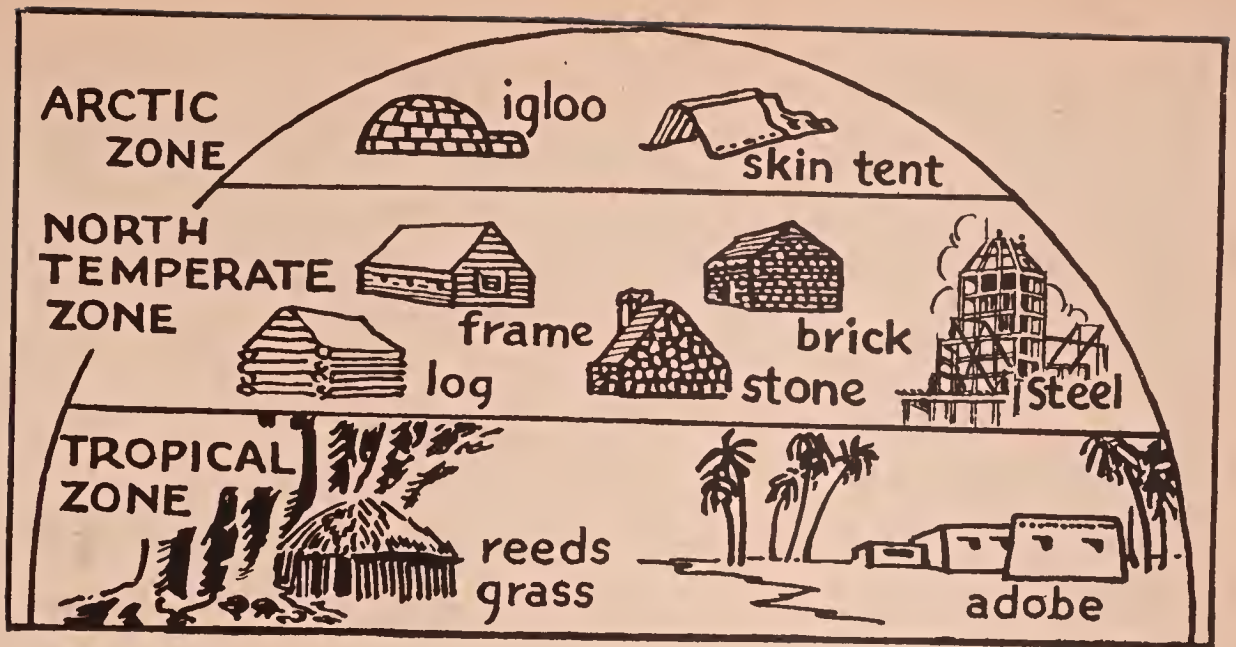
### *HOMES THE WORLD OVER*

#### CHAPTER

21. The Story of the House
22. Materials for Building the House
23. Furnishing the Home







## Chapter 21

### THE STORY OF THE HOUSE

Whatever language people may speak, one of the words dearest to them is the word that means *home*.

The birds in the air build nests. The fox digs himself a burrow in the ground. The beaver builds his home in a lodge in the middle of a stream. So, too, from the beginning man has had to make a home to shelter himself.

#### Houses of Long Ago

The hunters of long ago found shelter from bad weather and protection from wild animals in their caves. The nomad herders lived in skin tents, which they could carry with them from place to place. When men became farmers, they built houses near their fields.

In Egypt farmers learned to make bricks from clay, and they used these bricks to build their houses.

When the Egyptians learned to make metal hammers and chisels, Egyptian builders used these tools to cut stone into huge building blocks. With these huge cut stones they built the pyramids. Later the people in Europe used marble, granite, or other hard stones to build temples, cathedrals, and other large buildings.

But the people on the farms and in the towns of Europe continued to live in simple houses that took less time to build. Many people lived in houses built of stones that they picked up from their fields. They roofed these houses with thatch, which is usually a mixture of mud and straw. Such houses can still be found in European villages.

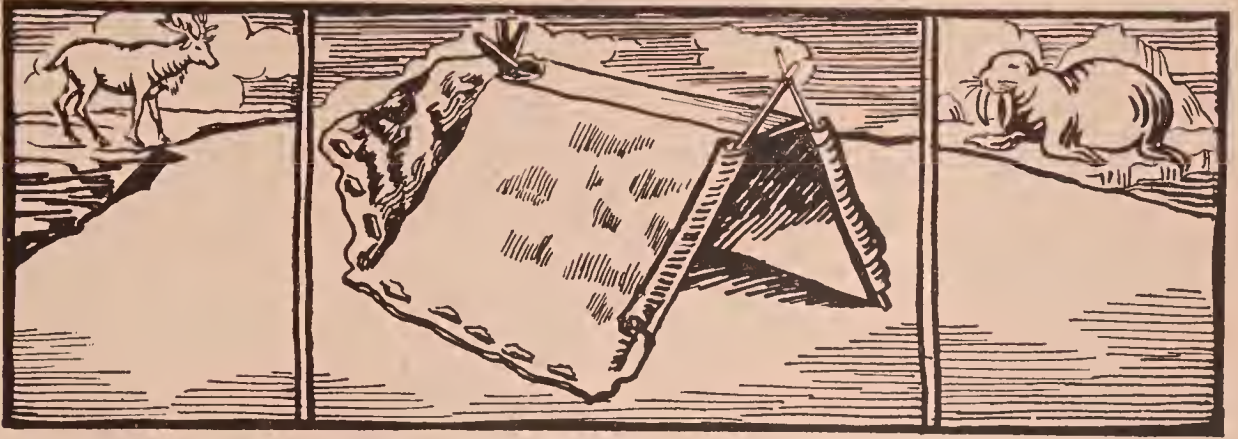
In some lands where stone was scarce and the climate warm and dry, people built their houses of adobe,<sup>1</sup> which is a sort of sun-dried mud brick, laid up to make a wall and then often covered with white plaster. Such houses can still be seen in southern France, in Spain, and in the southwestern parts of the United States.

In countries where wood was plentiful and cheap, many people built themselves wooden houses, first sawing the trees into boards. In Switzerland, which lies east of France, we could see many picturesque wooden houses, called *châlets*,<sup>2</sup> in which the Swiss farmers live. The wood for these houses is cut from the forests that grow on the slopes of the Alps Mountains.

<sup>1</sup> A Spanish word, pronounced *ah-dough'beh*.

<sup>2</sup> A French word, pronounced *shah-lay'*.





In the Few Warm Months Eskimos Live in Tents  
Covered with Animal Skins

### How Builders in Each Land Use Materials at Hand

In Greenland, and in the Arctic countries of North America, the Eskimos often build themselves wooden houses from driftwood brought in by the ocean. In the few warm



A Grass House in the Tropics

months that they have, other Eskimos live in tents covered with animal skins, but in the long cold winters some Eskimos live in snow houses built from cakes of snow.

In some tropical countries men build their homes of reeds and grasses.



When the white people came from Europe to America, they found the Indians living in different kinds of houses. The Indians in the tropical parts of America lived in grass houses. In the warm parts of our country, some Indians lived in adobe houses. The Indians who hunted buffalo on

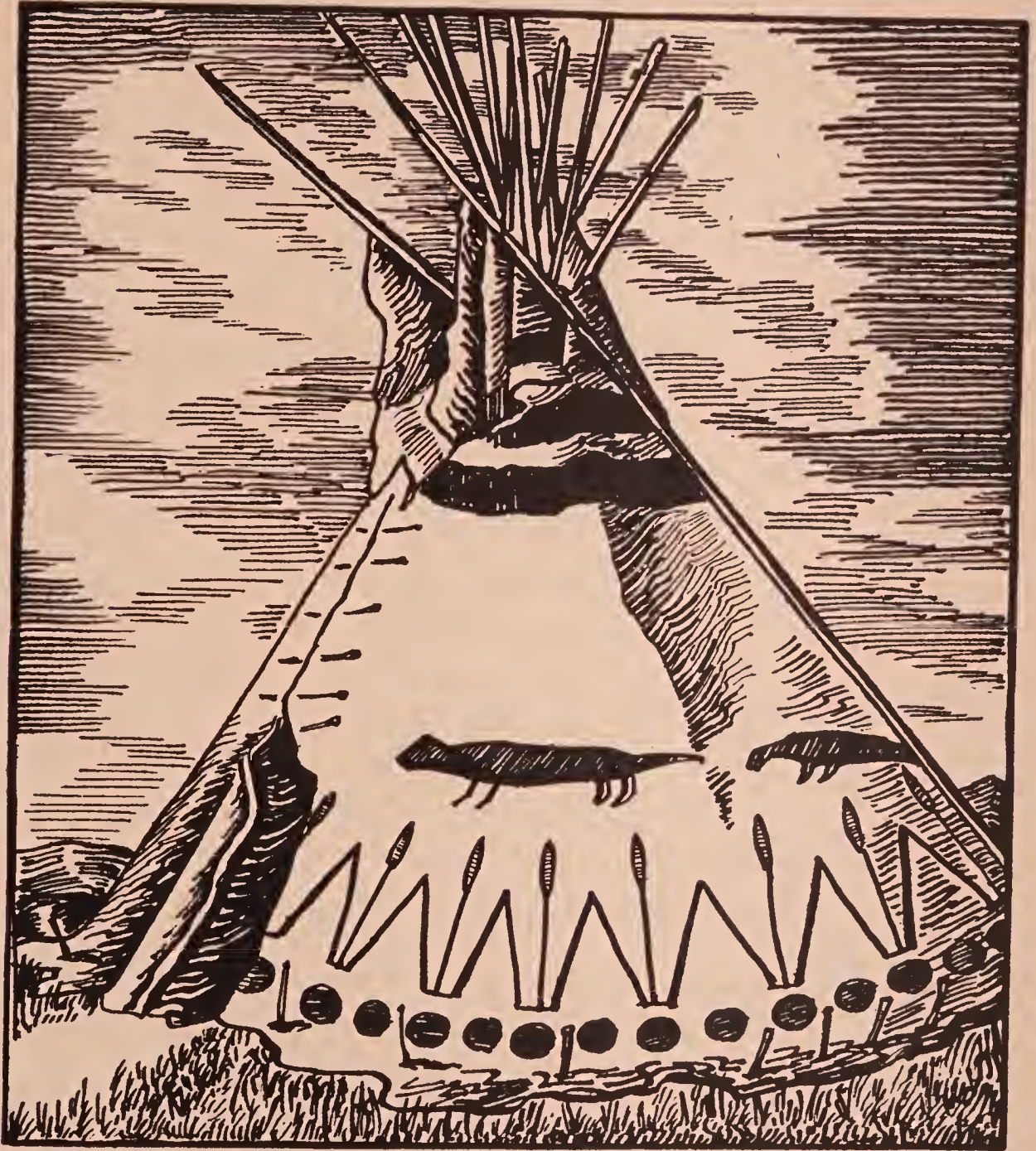


In the Southwestern Part of the United States Indians  
Lived in Adobe Houses

the grassy plains, or prairies, in the West lived in tents. The Indians along the Atlantic coast lived in houses made of rough logs.

The white men who settled in the part of America that is now the United States built their first homes of logs, as the neighboring Indians did. Later they began to build frame houses of boards. At first they cut these boards out of logs with handsaws. Then they built lumber mills on the banks of rivers and used water power to work their saws.

After a time, when many of the white people lived in towns, a few men built themselves brick houses. The bricks



The Prairie Indians Lived in Tents

were either made here or imported from Europe. In some places people used field stone to build churches, forts, and even homes.

As the white men went westward across America, their first shelters were rough log cabins. Then came wooden frame houses and brick houses.



### Why There Are Apartment Houses

Until about fifty years ago more than half the people in this country lived on farms, and each farmer lived in a separate house of wood or brick or field stone. In these houses people were still doing by hand much work that was soon to be done in the city factories by machinery. As the factories took over more and more of the work that used to be done in the home, the cities grew more crowded. Persons who worked in the cities and who wanted to live as near to their work as possible had to live in houses that would hold three or four families.

Then, as the cities grew still more crowded, houses were built to hold twenty or thirty families. Today in some cities there are houses that will hold hundreds of families. These houses are called *apartment houses*.

Apartment houses are built of brick and steel. City factories are also built of brick and steel.

In a few cities many men work each day in office buildings that are twenty, forty, or even more stories high. These skyscrapers are built of steel. In the next chapter you will learn how these high buildings are constructed.

### A Test to Try

Copy these sentences and write in the blank spaces the word or words needed to make the statements correct.

1. The Egyptians built the \_\_\_\_\_ of \_\_\_\_\_.
2. The Indians in the hot parts of America lived in \_\_\_\_\_ houses.



- 
3. The earliest American homes were built of \_\_\_\_\_.
  4. Many houses today are built of \_\_\_\_\_ or \_\_\_\_\_.
  5. Apartment houses are built of \_\_\_\_\_, \_\_\_\_\_, or \_\_\_\_\_.
  6. Very high buildings, having many stories, are called \_\_\_\_\_.
  7. Many early Indians of the \_\_\_\_\_ part of our country lived in homes called \_\_\_\_\_.
  8. Hunters of prehistoric times lived in \_\_\_\_\_.
  9. Herders of prehistoric times were \_\_\_\_\_. They lived in \_\_\_\_\_.

### Something to Do

1. See whether you can find pictures or make drawings of these kinds of houses:

a skin tent

a Swiss chalet

a log cabin

a thatched roof

an Indian tepee

an apartment house

an adobe

an Eskimo igloo

a skyscraper

## *Chapter 22*

### **MATERIALS FOR BUILDING THE HOUSE**

Looking about us in our homes, we see that the doors, the window sashes, the floors, are made of wood. All through our country, in twenty million homes and more, builders have used wood.

#### **How Wood Is Obtained for House Building**

Forests, supplying wood to builders, once grew thickly over the greater part of our land. Today a large portion of our woodland is gone. The trees have long since been cut down to make room for fields and towns and cities. Where, then, do the builders of today get wood for our houses?

Much wood comes from forests in the western part of the United States. Here, on the sides of mountains and in the wooded valleys, trees grow thick and tall. Much wood comes from forests in the southern states, from the Atlantic coast to the Gulf of Mexico. There are forests in the northern part of New England and near the Great Lakes. A good deal of our wood is imported from the forests of Canada.

Let us picture a winter in a lumber camp in Canada. Snow is on the ground. But the spruce, the hemlock, the fir, and the pine that grow in the forest are green. They belong to the family of evergreen trees, which are green all the year round.

The lumberjacks who work at logging live in cabins. One man cooks for all the men. Each day the forest resounds with the clang of their axes or the buzz of their saws. An ax hews out a notch in a tree. The cross saw, worked by two men, cuts its way through the heavy trunk, and the tree comes crashing to the earth. In a few months this part of the once green and beautiful forest will be gone. The lumberjacks will move on to build a new camp some miles away.

But chopping down a forest in Canada does not bring the wood to our homes. What happens next?

The trees are stripped of their branches, then sawed into logs. The logs are drawn to the edge of the nearest river. Here they are arranged in piles.

Then, when spring comes and the ice thaws, the logs, tens and tens of thousands at a time, are floated downstream to the lumber mills. The men who guide the logs on their journey are called *log drivers*. Imagine them on the river, leaping from log to log. Spiked shoes keep the log drivers from slipping. They use long poles tipped with iron hooks to help keep the logs moving down the river.

At one point near a bend in the river, the logs get caught and begin to jam. Before the log drivers can reach the spot, the jam is too large for them to pry the logs apart with their poles. The foreman gives the order to use dynamite. When the dynamite explodes, the jam breaks, and the floating forest continues downstream on its journey to the mill.

The work of logging is not the same in all forests.



In the snow-covered New England forests, the same methods are used as in Canada. But in the warm southern states, where the yellow pine grows, the men cut the trees all the year round, and the logs are hauled to the railroad on cars drawn by oxen or tractors. Sometimes the logs are sawed into boards by portable mills that are set up near the standing forests.

In California, where the giant redwood trees grow, it takes a long train of cars to remove a single tree. Each car carries one of the heavy logs.



A Flume Carrying Lumber

In the mountain lumber camps of the West, the logs are sometimes brought down from the hills by flumes, which are wooden slides miles long. Water flowing down the flumes carries the logs to the valleys below.

Sometimes loggers working near broad rivers make a raft of the logs by fastening great numbers of them together with iron chains. Then, living aboard the raft, the men help float it to the towns where the lumber mills are.

In the lumber towns, machines carry the logs into the

mills. Inside a sawmill, machines carry each log forward against a machine saw. With an almost deafening noise, the saw cuts its way through the log from end to end. Next, the log is pulled back and turned upon its flattened side. Again it is pushed toward the saw. Again the saw does its work. Then a third time and a fourth, the saw cuts through the log, making it a square post, or beam. Some of the beams are cut into boards. The small strips that have been sawed from the log are used for making thinner strips of building wood called *lath*.

In planing mills, machine planes give the boards a smooth finish.

From the sawmills the wood is now carried by boat or train to the lumber yards nearest our homes. Some of the lumber is used in the factories where men make furniture. Some of it is bought by the men who build our houses.

### Brick Is a Good Building Material

Although we all have wood in our homes, many of us live in houses whose walls are made of brick. Brick is a good building material. Brick is fireproof and is therefore safer than wood for large city buildings. Apartment houses, where many families live, must be made as nearly fireproof as possible.

Bricks are made of clay and sand. In places where there is the right kind of clay, brickyards are built. In a brickyard, workers loosen the clay with machines. They use machine shovels to load the clay on cars, which are drawn



to the clay mill by an engine. In the mill, machinery grinds the clay to a fine powder. Machinery kneads a mixture of the ground clay and water. Machinery cuts the clay into bricks.

All these things that the brickmaker of today does by machinery, the Egyptian brickmaker did by hand. The Egyptian baked his bricks in the sun. Today the bricks are baked in a huge *kiln*, or oven, which can hold thousands of bricks. The bricks are then loaded on cars or boats and sent on their way from the brickyards to the builders.

### **Stones Are Mineral Building Materials**

Wood is a plant material that helps the builder. Clay is a mineral that helps the builder. Stones, which are also mineral, are used in building. The stones most used in buildings today are granite, sandstone, slate, limestone, and marble.

Marble is a beautiful stone, but it does not stand rain or snow well. Builders in our country therefore use it mostly for the inner walls and stairways of buildings.

Granite is hard and long-lasting. Builders use granite for building foundations and for the outside walls of buildings. They also use sandstone, limestone, and slate.

In parts of the world there are large stores of marble, granite, and other stones. In these places men cut large blocks of stone out of the hillsides or out of pits in the earth.

The mountains of Carrara in Italy are almost solid marble. In our own country many of the hillsides in the northern



part of New England are rich in marble and granite. A place from which stone is cut is called a *quarry*.

In a stone quarry men use machine drills to bore holes in the rock. Wedges are driven into these holes, or powder is used to break off blocks. Stonecutters trim the rough stone. The trimmed stones are then hauled down to the railroad station or the dock on the shore of the river or of the ocean. The transportation of freight by water costs less than transportation by land. For this reason the heavy stones are often shipped by water on barges for as much of the way as possible.

In building with brick or stone, builders use a mixture called *mortar*. This mortar is made by adding sand and water to cement. Wet mortar put between the bricks or stones acts as a binder, holding them together. When the mortar dries, or sets, it becomes hard and helps make the wall strong and durable.

Today builders often use another material to take the place of brick or stone. They build with concrete. Concrete is a mixture of cement, crushed stone, and water. The cement is made from lime, baked, and then ground into a very fine stone flour, or powder. This powder, crushed stone, and water are then put into a mixer made of steel. After this whole mass is thoroughly mixed and has had time to harden, it becomes concrete.

To build with concrete, men make wooden or metal molds for the walls or foundations that they have planned. When the concrete is poured from the mixer into the molds, it gradually sets, or hardens. The molds are then removed.

A concrete wall, especially if it has steel bars to reënforce and strengthen it, will last longer than a brick wall. It is about as strong as a stone wall.

### Steel, the Strong Material

Now we come to a building material that is neither wood, nor brick, nor stone, nor concrete. This is steel. In the crowded cities, building lots are expensive. The builders in the cities, eager to build high so that many people can live over one building lot, could not depend on any of the old building materials. High buildings made of wood, brick, stone, or concrete would not be strong enough or would have to be made with walls so thick that there would not be much space left for rooms. With a steel framework high buildings can be erected with safety.

Steel, which is a form of iron, was once rare and expensive — too expensive to be used in building. For hundreds of years men used iron in tool-making. They obtained the iron for their tools from iron ore that they found in the earth. In iron ore the iron is mixed with rock and other impurities. The metal workers heated the ore in furnaces until the heat melted the ore and separated the liquid iron from the impurities. This process is called *smelting*. After smelting the iron, ironworkers formed the iron into the shapes of the tools they wanted. These iron tools were rather brittle; and the ironworkers were glad to learn that if they could use greater heat in smelting the iron ore, they could get rid of more of the impurities. Finally by using very great heat



and mixing the liquid iron with other minerals, the metal workers learned to make steel, which is a much better material than iron for many tools.

But with the poor furnaces of long ago and with only wood for fuel, the metal-workers were able to make very little good steel. Out in Asia, in the land of Arabia, there is a city called Damascus. This city became famous because of its steel-makers, who made fine steel blades for springy swords and daggers. In the time of Columbus, the soldiers of Europe prized these blades of Damascus.

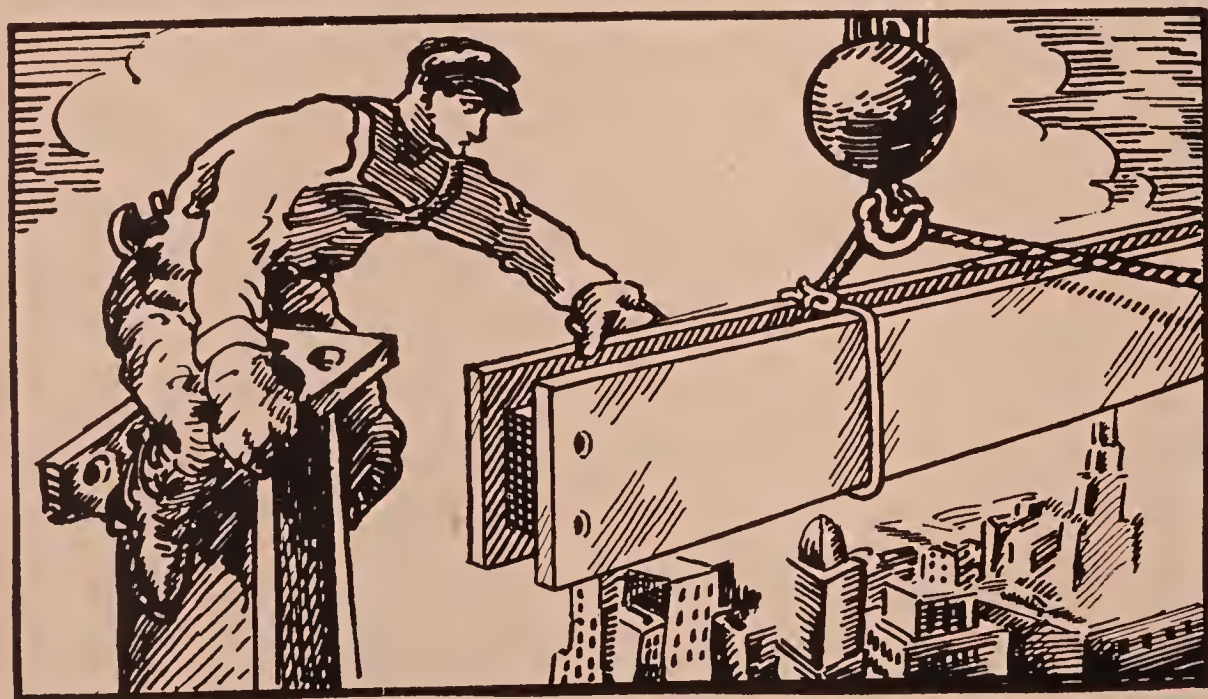
So, although for a long time steel was used, it was only for making costly swords and daggers. Steel remained scarce and costly until about seventy-five years ago, when men learned how to make it more cheaply. Steel-makers built huge furnaces in which blasts of air are forced through molten iron. In a few minutes these blasts can change tons of liquid iron into steel.

In this country some of the largest iron and steel mills are found in the city of Pittsburgh in the state of Pennsylvania, in the city of Birmingham in the state of Alabama, in Buffalo in the state of New York, in Chicago in the state of Illinois, in Cleveland in the state of Ohio. These cities are good places for steel mills because they are near enough to the iron mines from which they get their iron ore; they are also near enough to the coal mines from which they get coal for their furnaces. The iron ore is brought to the mills by water and by train. Trains from the coal mines run right into the yards of the mill.



In a modern steel mill, there may be a long row of blast furnaces, each one making as much as eighty tons of steel at one heating. This liquid steel is run off into ladles, which pour it into molds. The molds shape the liquid into great lumps of steel, called *billets*. One of these billets may weigh fifteen tons.

The billets are carried along to rolls in the rolling mill. The rolls look like a giant clothes wringer. The white-hot



Setting a Steel Beam in Place

billet is squeezed through a set of rolls, and then back again, perhaps twenty times. It is now much longer. On it goes to the next set of rolls, where the same squeezing and rolling takes place over and over again. A billet which went into the rolling mills seven feet long may have been rolled into an eighty-foot steel column or a hundred-foot beam, ready to be cut to any length in the cutting room.

Next, and last, these pieces of plain steel go to the bridge shops in just the right sizes for their use. Here the rivet holes are punched. Everything that can be done before the steel framework is set, is done here. From the bridge shops, the columns and beams, of many different shapes and strengths, all marked and numbered, go directly to the building where they are to be used.

### Steel Made the Skyscraper Possible

When men learned to make steel more cheaply in many shapes and sizes, steel that would not crack, or shrink, or wear out, the *skyscraper* became possible. So, about 1885, the first skyscraper appeared — ten stories high. Today, many of these first skyscrapers are being torn down and rebuilt to seventy and eighty stories.

When we speak of a skyscraper, we usually mean a building with its weight supported, not by its walls, but by a framework of steel hidden within the walls. This framework is made up of upright steel columns for the outside walls, which are supported at each floor by beams and girders.

Beams are crosspieces of steel. A girder is a larger, heavier crosspiece which supports other beams.

The framework is held together by steel rivets or by welding.

A rivet looks like a thick blunt nail with a flat head. Each rivet is heated red-hot and placed in the rivet hole that was punched for it in the bridge shops. The rivet is driven through the beam to be riveted, and the small end is



hammered into a head so that it cannot come out. A rivet is stronger than a bolt, because it is forced into the punch hole when red-hot and then hammered down until it fills every part of the space and becomes almost a part of the beam itself.

About 1926, men began to experiment with welding the framework instead of riveting. In welding, two pieces of metal are melted together by the heat from electricity or some other source.

Before a skyscraper can be started, all the steel must be ordered from the mills, in the right sizes and shapes. It must be stored near by, to be at hand as it is needed, for there is no place in our large cities to store such supplies.

The one hundred and two stories of the Empire State Building in New York used more than 57,000 tons of steel. To prevent delay, the steel was ordered for two floors at a time two days before it was needed. The workmen had to be on schedule, so that they would be ready for each steel delivery when it came. About four floors of steel a week were set. Five months after the building was started, the steel framework was in place to the fiftieth story.

This famous building used more than three hundred tons of a new kind of steel, called *chrome nickel steel*, for the outside trimming. This steel is tough and hard, yet it is easily workable. It will not rust. The Chrysler Building in New York has a cap of this bright steel.

If you could follow the building of a great skyscraper from day to day, you would see something like this:



As soon as the foundations are ready, truckloads of steel pieces arrive, in just the sizes needed, all numbered and ready. Uprights and beams are unloaded and placed near where they are to go. Bundles of beams weighing six or more tons are swung aloft by derricks or carried to their places by hoists like elevators. Later these hoists will carry the concrete, the bricks or stones, and the hollow tiles for the partitions.

When the steel workers have set the framework for the second story, riveters begin to rivet the framework of the story below. This is done with great skill. One man stands at the forge, heats the rivets and tosses them with a pair of tongs to the riveters. The riveters place the rivets in the punched holes, drive them in, and head them over.

As each story is set, it is inspected and the steel painted over with two coats to protect it from the air.

Pipes are now laid and wires put in place, through which water and electricity will be supplied later.

The concrete workers follow the riveters. They begin on the story just riveted below them and lay the concrete ceiling of that story, which is also the floor of the next.

When the steel window frames are put in place, the masons and bricklayers begin to wall in each story. The inside workers are now protected and can go to work. In a climate like that of New York, it is important that the work move along on schedule time, so that the outside will be finished before winter begins. The windowpanes are put in last.

It is like a race; each kind of workman follows as soon as he can, and all try to reach the top in the time set.

When the famous Waldorf-Astoria Hotel in New York was torn down, samples of the old steel from different parts of the building were tested to see how much they had worn. In every case they were found to be practically as good as when they were set. This has been found to be true of other buildings. There seems to be no reason why the steel framework should not last several hundred years except that styles in buildings change and buildings may be torn down long before their steel framework wears out.

### Things to Do

1. Be very sure you understand the meanings of the words and phrases in the columns below. You surely can make a word puzzle of some of them.

quarry	furnaces	girder	kiln
explosion	billets	framework	welding
mortar	rivets	columns	inspected
concrete mixture	experiment	derrick	on schedule

2. Copy these sentences and write in the blank spaces the word or words needed to make the statements correct.

- (1) The largest iron and steel mills in America are found in \_\_\_\_\_, in \_\_\_\_\_, in \_\_\_\_\_, and in \_\_\_\_\_.
- (2) Skyscrapers are built of \_\_\_\_\_.
- (3) The tallest building in the world is in \_\_\_\_\_.
- (4) It is \_\_\_\_\_ stories high.
- (5) \_\_\_\_\_ tons of steel were used in building it.

- (6) Skyscrapers were first built in the \_\_\_\_\_.  
(7) The largest trees in the world are in \_\_\_\_\_.

3. In the first column is the name of a material, in the second column the name of the country in which the material is found. Copy these columns in your notebook, writing on the same line the two words that are connected in meaning.

1. Carrara marble	Atlantic coast
2. granite	Pennsylvania
3. lumber	Italy
4. redwood	Northern New England
5. iron ore	California



## *Chapter 23*

### FURNISHING THE HOME

How many things it takes to furnish a home — beds and bureaus, tables and towels, rugs and rocking chairs, dishes and drinking cups, china closets and chests, pictures and plants. These are just a few of the many things that help to make our homes more comfortable.

The hunters who lived in caves may have had little furniture, but they did have pictures. The pictures were paintings of the wild animals they hunted. They painted these pictures on the walls and ceilings of their caves.

The herdsman, living his nomad life, also had little furniture. He and his people slept on skins. They squatted on the earth or on woven mats.

### Clay Pots, Chinaware, and Glass

When men long ago observed that clay was hardened by the heat from their fires, they shaped the soft clay into pots in which to store their grains. They hardened these clay pots by baking them in ovens that they built over their fires.

In the beginning, clay pots were shaped by hand. Then some one invented a potter's wheel, a stone set on an axle. Putting his clay on the stone, the potter turned the wheel;

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and as the wheel turned, he used his hands to shape the clay into whatever form he chose to give it.

The Egyptians often painted pictures on pots. So did the Greeks. Some of their clay pots, jars, and vases that have been buried for thousands of years have been dug up in the ruins of old cities.

Today clay is used in making plates, saucers, and bowls. The finest of this ware is called *chinaware*, because hundreds of years ago only the Chinese knew how to make it. Now very good chinaware is made in our own country.

If we look at our china cups, we can see how smooth and shiny they appear. This shiny look is due to a glaze, or glassy substance, that covers the surface of the cup. A long time ago men learned the art of glazing pottery. The glaze that the early potters used may have helped men to learn how to make glass. Long ago the Phœnicians, who once lived on the eastern shores of the Mediterranean Sea, not far from Egypt, learned to make glass. But it was not until about the time of Columbus that people learned how to make glass so clear that one could see through it easily.

For a long time transparent glass was so very expensive that most persons could not afford to buy it. But today glass factories make great quantities of glass, and it is not expensive. In glass factories sand and certain other minerals are heated together in a furnace. When this mixture melts, it becomes liquid glass; and as the liquid glass cools, it becomes sticky. Just here the work of the glass-blower begins. He dips his blowpipe, which is a tapering tube,

into a pot of melted glass, until enough hot glass gathers on the end of it. He then blows through the tube, and as he blows, the warm glass expands like a soap bubble. He now can shape this glass bubble by heating and blowing it again or by placing it in a mold. As he continues to blow, the glass takes the shape of the mold.

In this way glass-blowers can make jars, bottles, tumblers, and vases. But today machinery is used to do the blowing, and a single glassmaking machine, with machine blowers and machine molds, can shape thousands of electric light bulbs in a day.

Machinery is also used in making window glass. There is so much glass used for the windows in our buildings that we may well call glass one of the building materials.

### **Furniture Was Once Rare and Expensive**

Before the days of Columbus, as you have just read, few persons had any glassware, and they had no glass windows. In fact, up to the time of Columbus only the rich people had much wooden furniture. The poor people had no such chairs or tables or beds or bureaus as we have today. The peasants, as the poorer farmers of Europe were called, sat on rough stools made by fastening a few boards together. Their tables were rough planks laid across wooden trestles. Their one most important piece of wooden furniture was the chest in which they stored their clothing, their food, and such few other things as they owned. These chests must have been used by rich and poor alike, for when the



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colonists came to America, they brought these chests with them.

About the time that America was being settled, the rich people in Europe were thinking how they could make their homes more comfortable. They hired men to make them fine tables, better chairs, and chests with drawers in them. In these drawers the rich folk kept the linen tablecloths and the silver knives and forks that were coming into fashion. The furniture-makers also made for the rich people great wooden beds, with four posts on which curtains were hung to keep out the cold winds.

When the European settlers in America began to prosper, they also bought these new furnishings to make their homes more beautiful. For a long time only the rich colonists could afford these things; later the poorer people were able to buy them.

Today in many large cities in this country there are factories in which men make furniture from lumber. With the machines in these factories helping to make wooden furniture more quickly, almost every one can have wooden beds, tables, chairs, bureaus, sideboards, bookcases, writing desks.

### Our Furnishings Have Stories

Almost everything that we use to furnish our homes has a story.

There is the story of Oriental rugs that we buy from the people of Asia. In the olden days, the weavers in India, Persia, and China wove mats, or rugs, that the people used

instead of chairs. In time they learned to design these rugs so beautifully and to color them so richly that today people all over the world use them to decorate their homes.

There is the story of knives, forks, and spoons — a story that begins with the hunters who used their fingers instead of forks.

There is the story of the stove. This story begins when men first built outdoor fires to warm them and cook their foods. It tells us of the time when men learned to build fires indoors in open fireplaces, with chimneys to carry off the smoke. It carries us to our own day when people use coal, oil, gas, and electricity for heat. In large homes and in apartment houses today, pipes carry steam, hot water, or hot air from a furnace in the cellar to heat all the rooms in the house.

Another story is the story of the light in our homes. This story would tell how the people of long ago burned vegetable and animal oils in small lamps, and how our great-grandmothers made candles from fats and vegetable oils. It would tell how, less than a hundred years ago, people learned to use kerosene oil and gas. It would tell how now in our own day many homes are lighted by electricity. Even the match has a long story.

The full story of all these things would take too long to tell. We will leave them to go on to the story of transportation, so that we can see how all the things that we have in our homes are brought to us from the places where they are made.

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### Things to Do

1. Make a list of the things needed to make our homes comfortable.
2. Make a list of the materials used to make each of these things.
3. Tell how man first invented dishes.
4. The invention of pottery is very important. Can you tell why it is so important? Read this chapter carefully and see if you can discover anything we do today that we could not have done had man not learned to make clay into dishes.
5. When you go on a camping trip, you take along the things you think you really must have to live comfortably. Make a list of some of the house furnishings you take.
6. Select six words from this chapter and make a word puzzle like the ones given you in earlier chapters.





## PART VI

### *BINDING THE WORLD: TRANSPORTATION— COMMUNICATION*

#### CHAPTER

24. Carrying and Being Carried
25. Buying and Selling: The Story of Trade
26. Sending Messages: The Spoken Word, The  
Written Word, The Printed Word
27. Sending Messages: Telegraph, Cable, Tele-  
phone, Wireless, Radio





## *Chapter 24*

### **CARRYING AND BEING CARRIED**

All through the day and night, wagons, cars, automobiles, ships, and trains are carrying people and things. We need these ways of carrying and being carried. Ships and trains carry people and goods from the farms to the cities, from city to city. They carry goods and people from the cities to the farms. They also carry people and goods all over our country and from our country to other countries.

Man is not alone in his need of moving from place to place. Plants may get their food while rooted to one spot; but birds must fly, fish must swim, the animals of field and forest must roam about in search of food.

#### **Transportation in Wilderness Days**

In the days when all the world was a wilderness, men, like the animals of field and forest, had only their legs to carry them. The hunters returning with their loads carried their game on poles slung across their shoulders. To this day in many parts of the world people carry their burdens on their backs or on their heads.

After a time, man tamed the horse and used it to carry him and his packs on long journeys. Camels carried traders and their goods across the deserts in Africa and Asia. The

llama carried goods across the mountains of Peru in South America. The camel, the llama, and the horse are still used as beasts of burden.

Long after man learned to use animals for carrying, some one, it may have been a herdsman in Asia, invented the wheel and the wheeled wagon. Wheels were a great help in carrying. Wagons could hold heavy loads, and with wheels under the wagons to roll them along, horses or oxen could draw greater loads than they could carry on their backs.

But even with wagons and animals to help, traveling and carrying goods by land was not easy. It took time to clear roads. When heavy rains made the roads muddy, it was almost impossible to move from place to place.

Long before the wheel and the wagon were invented, some people saw that, if they could travel by water, they could move about more rapidly than they could through thick forests. Hunters and herdsman may have crossed streams or even floated down streams on logs. They may have noticed that a log pointed at one end moves through the water more easily. Then some one may have seen that, if a log were hollowed out, it could carry things, and it would be less likely than before to tip over. Poles could be used as paddles or oars to help in moving the log through the water. In some such way, step by step, men learned to use boats for moving from place to place.

In our story of man's conquest of the wilderness we read how the Egyptians learned to put sails on their boats, and how, with the wind to help them, they sailed up and down

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the Nile River. Boats with sails carried people along the Mediterranean Sea to the countries of Europe. This was one of the ways that the knowledge of farming was carried to people who lived in Europe. Guided by compasses, sailing ships from Europe later crossed the Atlantic Ocean and reached America. Other ships brought many people from Europe to live in America.

### The Steamboat Is Invented

Until one hundred years ago men used oars or the power of wind to make their boats move. Then people discovered how to use the power of steam instead of oars and wind.

Some one in England had made a steam engine. In this engine, the heat from the burning fuel caused water to boil, and the force of the steam from the boiling water was used to work a pump, which pumped water out of coal mines.

Soon men began to plan other ways of using the power of steam.

One man, Robert Fulton by name, decided to use the force of steam to turn paddle wheels on the sides of a boat.

In the year 1807, his boat was ready. He called it the *Clermont*. Many persons called it "Fulton's Folly."

Fulton tested his boat on the Hudson River. When the engine started, the steam-driven paddles turned in the water, and the boat moved upstream against the current at five miles an hour. Steam was taking the place of wind and oars.

The first steamboats ran on rivers. But soon steamboats were running on lakes and seas and on the ocean as well.



Today sailboats are still used, but most of the large boats on the rivers and lakes and oceans are steamboats. On most of our steamboats the steam engine no longer turns side-wheels. Instead, there is a powerful propeller on the rear of the boat. The engine turns the propeller, and then, as the propeller revolves, it drives the boat forward.

Some of the ocean steamboats are like huge hotels. They have room for hundreds of persons, who live on the boats for days and weeks. Such a boat may have not only dining rooms, sleeping rooms, music rooms, but even elevators, tennis courts, a gymnasium, a swimming pool, a barber shop, a children's toy and game room. Ocean steamships carry thousands of tons of goods besides the passengers.

There are many steamships that carry people and goods across the Atlantic to Europe. Some of these boats go through the Straits of Gibraltar into the Mediterranean Sea, past Italy and Greece and Turkey to Egypt.

There are steamers that go down the Atlantic coast of the United States to Cuba and the other islands near Cuba. Some steam farther south to the countries of South America. Some go into the Pacific Ocean by way of the Panama Canal, which engineers have cut through the narrow piece of land that connects North America with South America. In this way these steamships can more quickly reach the Pacific coast countries of both North America and South America.

Many steamships go from the Pacific coast cities to Japan, China, India, and Australia.

### The Steam Locomotive

Until the time of the steamboat, carrying by land remained the same as it had been since the days of the first pack animals and the first wagons drawn by animals. But then, seeing how an engine could turn the wheels of a boat on water, men built steam engines to turn the wheels of wagons on land, and they laid rails on the roads, so that the wheels would turn more easily. The front wagon, which carried the steam engine, was called a steam locomotive. This locomotive pulled a train of carriages, or cars. The road of rails was called a railroad.

In this country about the year 1830 a railroad was built from Baltimore to a village twelve miles away. Soon many more miles of railroad were built.

On these early railroads little steam locomotives pulled a few curious-looking carriages. The engines used wood for fuel. The sparks from the engines flew back over the passengers. The carriages were poorly heated by small wood-burning stoves and poorly lighted by oil lamps. The rate of travel was only about twelve miles an hour, not much faster than one can run. Some of you may have seen one of these old trains on the balcony of the Grand Central Station in New York City.

Today a steam locomotive is a huge and beautiful machine weighing many tons. It burns coal or oil. It can pull ten or fifteen passenger cars at high speed. It can pull many heavily loaded freight cars. Some of the freight cars,

called *refrigerator cars*, have ice to keep cool and fresh the fruits or meat that they carry. Some are heated to keep vegetables from the south from freezing on their way north.

Some of the passenger cars, called *Pullmans*, have sleeping berths. The trains also have dining cars. Almost all trains today are well heated and are lighted by electricity.

Railroads and steamboats have helped carry men into the West to tame the American wilderness. They have bound the whole country into one. They carry the farmers' crops to the city. They carry manufactured goods from the cities to the farms.

### New Ways of Carrying and Being Carried

As the railroads and steamships carried people into the country, the number of farms increased, but at the same time the cities kept on growing. The people in the cities had to go miles and miles to get to their work. A way was found to carry them. Some men learned how to use electric current to turn the wheels of electric cars. These electric cars, running along tracks in the city streets, could carry men to their work. The electric power that turns the wheels of the cars comes through wires and rails from the electric power house.

Recently the steam locomotives on some railroads have given way to powerful electric locomotives. These electric engines can pull a train of a dozen or more heavy passenger cars as fast as ninety miles an hour.

About forty years ago some persons found a way of making



a car that would not need tracks. They invented small gasoline motors that would make their own power. They put these motors into their cars, and so automobiles were born. Today there is an automobile for one person out of every five in this country. Automobiles and automobile trucks are a great help to the farmer. They help carry his



Forging a Steel Axle for an Automobile

goods to the railroad station or to the near-by town. They help him bring home the things that he buys in the city. Automobiles are now so common that it is perhaps hard for you to realize that they were just beginning to be seen on the streets when your parents were children. In those days an automobile was called a *horseless carriage*. You can see why that name seemed a good one then.

The latest way of carrying things is by airplane or by dirigible. The sea is a good road. The land road is good. But it seems that the great new road is the air. With a

gasoline motor in his airplane or dirigible, man can ride anywhere.

Our airships are not perfect yet. The first successful flights in the air were made about thirty years ago. By 1924 airplanes flew around the world, as you read in the first chapter. In that same year a dirigible came from Germany across the Atlantic Ocean to the United States. Airports and landing fields are being built in many parts of the world. Our own country has nearly two thousand, and nearly eight hundred more are planned. Today there is air travel by day and by night. For night travel flying fields have to be well lighted. There are airports along both the Atlantic and Pacific coasts, for flying between ocean liners and the shore. At Oakland, California, there is an airport that helps to join rail and air lines across the continent with ship lines across the ocean. Planes that can take off from land or water have direct contact with steamships.

You have all heard of Colonel Lindbergh's famous flight across the Atlantic Ocean, how he flew alone in his plane that he called *The Spirit of St. Louis*. His plane was named for the city of St. Louis, which is in the state of Missouri. In St. Louis there is a flying field where much flying is done both for pleasure and as a means of travel. During June and July, 1930, it is said that 14,300 passengers left Lambert Field, the St. Louis flying field, and 15,000 passengers arrived.

At the Grand Central Terminal Airport in Los Angeles, California, during the first six months of 1930, 25,608 pas-



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sengers landed. During the busiest day 253 airplane passengers arrived in that city.

Airports are now scattered over every state in the United States. A recent count showed that California and Texas each has more than one hundred airports, while Pennsylvania and Ohio have more than seventy-five each.

Some of these are for airplanes carrying passengers and goods. But there are many airports owned and operated by the governments of the states and the United States, for airplanes carrying messages and transacting important business for the Army and Navy, and for other departments of the government.

All over the world this new way of traveling is fast being made safe. England, France, Germany, and Italy had well-developed commercial flying before Lindbergh's flight to France created a new interest in air travel in America.

When airships become safer and can carry larger loads, they may do much of the work now done by ships and railroads. Even now mail is carried by airplanes from the Atlantic coast to the Pacific coast, and one of the big German airships makes frequent flights from Germany across the Atlantic Ocean to South America.

### **The Story Briefly Retold**

Now, if we look back at our story of transportation, we see that until about one hundred years ago men were using wagons and animals on land, sailships on the water. They could not carry things in the air. Suddenly there came the



steam engine, the electric engine, and the gasoline motor, which made travel on sea and land swifter. Then the gasoline motor opened up traveling by air.

With the coming of the railroad, hundreds of thousands of miles of good steel track have been laid across the lands of the earth. With the coming of the steamship, traders have been able to set up trading posts in almost every corner of the world. With the coming of the automobile, men have built hundreds of thousands of miles of good highroads, binding the farms and cities of our land. With the coming of the airplane, airports and landing fields are rapidly increasing, making distances shorter, because flying is the fastest method of travel.

With all these aids to travel and to the carrying of goods, the whole world has been brought near to us. Any one who saves enough can travel around the world. Any one who does his share of the world's work can earn enough to buy for his home food and clothes and other things that have been brought to him from the four corners of the earth.

### Questions to Answer

1. Why did some persons call the *Clermont* "Fulton's Folly"?
2. Passenger cars are sometimes called *coaches*. What did this word mean before passenger cars were made?

### Things to Do

1. Draw a series of pictures showing man's ways of traveling on land.
2. Draw a series of pictures showing man's ways of traveling on the water.

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3. If you cannot draw well enough to make these pictures, you would find collecting them from old magazines very interesting. Mount them and place them around your classroom to help you in your study of this chapter.

4. Write a short story of the invention of the first steamboat, telling who invented it, when, its name, and giving an account of its first journey.

5. On your outline map of the world trace the route traveled by a ship going from New York City to England; from New York City to Italy; from Italy to Egypt. Trace the route traveled by a ship going from New York City to the western coast of South America.

6. Find out how long it would take to make any of the trips you have traced on your map. Travel folders published by steamship companies will help you with this lesson.

7. On your outline map of the world locate the Atlantic Ocean; the Pacific Ocean; the Straits of Gibraltar; the Mediterranean Sea; the Panama Canal.

8. Tell the story of the earliest locomotives.

9. Tell the story of the airplane.

10. On your outline map make a dot or a star with your blue pencil showing the locations of the largest airports in the United States.

## Chapter 25

# BUYING AND SELLING: THE STORY OF TRADE

We have just read how the ships and trains of our country are carrying goods from the farms to the cities and from the cities to the farms. We have read how ships and trains are helping to carry goods from one country to another. Most of these ships and trains are carrying goods from people who wish to sell to people who wish to buy. The buying and selling of goods is called *trade*.

### Buying and Selling Today

The farmers who produce more food than they need for themselves sell the remainder to the cities. The city people who produce more clothes and tools than they need, sell the remainder to the farmers. But, as a rule, the farmer does not sell his wheat directly to the people living in the city. The farmer and the city dweller buy the things they need from stores where the storekeepers have laid in a stock of goods for them to buy.

How does the farmer get the money with which he buys from the stores? When the farmer sells to the cities the crops from his fields, the animals from his barn, milk, butter, chickens, eggs, or cheese, he receives money in return. In



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the same way, when the city people sell the farmer goods made in their factories, they receive money in return. All people receive money for their work, and then they use this money to help them in their trading.

In all this buying and selling, ships, trains, wagons, and automobiles are carrying money and goods back and forth between the farms and the cities. Ships and trains carry money and goods from all over the world to the large cities and to the storekeepers, who make their living by buying and selling.

Today the farmer in the country buys the city goods from the country store, which has a stock of almost anything from a pin to a phonograph. When he reads the advertisements in the newspapers or magazines about goods sold in the city stores, he sometimes buys these things by mail. He sends his letter and money to the city store, and the city store sends him the goods by parcel post.

Many farmers have mail-order catalogs in their homes. A catalog has a list of things that a mail-order store in the city has to sell. The catalog also shows pictures of these things and tells the price of each one. If the farmer and his wife need any of these things, they send their order and money to the mail-order store in the big city. The mail-order store sends them what they order.

The people who live in the cities buy from many different kinds of stores. They may buy hats from a hat store, food from the grocery and the meat market, furniture from a furniture store; or they may buy the different things they

need from a department store, which is like a country store, except that it is much larger.

A city department store sells almost everything. In the department store there is often a grocery department, a meat department, a furniture department, a clothing department, a toy department, and many more departments, each of which may be as large as the smaller stores scattered through the city.

Many of the stores do not buy the things they sell directly from the farmers or the factories. They buy from other stores, called *wholesale stores*, which buy very large quantities of goods at a time. A small grocery store may buy ten hundred pounds of sugar from a wholesale sugar merchant, who keeps great quantities of sugar in his wholesale store. The wholesale dealer buys the sugar from a sugar refinery. The sugar refinery buys its raw sugar from sugar plantations. This is how people trade today, but people did not always trade in this way.

### Trading in the Older Days

Trade has a story, just as transportation has a story. This is the story of trade.

The early hunters had little need for trade. They hunted for their own food and clothes.

When some men became herdsmen and others became farmers, and still others lived in towns and cities, these men had to trade.

Some hunters may have wanted wool from the herdsmen.

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Some herdsmen may have wanted furs from the hunters. When the herdsmen did not have enough wild grain, they wanted the good grain raised by the farmers. The farmers who raised more grain than they needed, wanted clothes woven by weavers in the towns and cities.

In the beginning, when the people wanted things from one another, they often tried to get them by force. The armed hunters tried to steal from the herdsmen. Fighting herdsmen came into the farming countries to steal grain from the farmers who had stored it up in barns. The sailors who sailed from the ports in the farming countries sometimes set out in ships to rob the people of other countries.

People fought to defend their goods against the robbers, and many lost their lives in such fighting, but in time many persons came to understand that it is better to exchange goods peacefully than for both sides to kill each other.

### Trading by Exchange of Goods

These wiser ones took to trading. The first trading was done by exchanging goods. Somewhere between the forest homes of the hunters and the pastures of the herdsmen, men would meet to exchange furs for wool. Somewhere between the pasture lands of the herdsmen and the tilled fields of the farmers, men would meet to exchange wool for grain. In Egypt the farmers came to the towns to exchange part of their grain for the things made by the workers in the cities.

In those early days of trade exchanging goods was not always easy.



Let us imagine an Egyptian farmer who comes to town with ten bushels of grain, in exchange for which he wants one new jar. He finds the potter displaying his jars on the street in front of his shop. But the potter has all the grain he needs. How can they exchange?

“Take my fine grain,” says the farmer. “You may have it for that silly jar.”

Says the potter, “I do not need poor grain; I need some good bricks to repair my kiln.”

The farmer answers: “Give me the jar. A brickmaker will give you bricks for my grain.”

This is a good idea, the potter agrees, but it turns out that the brickmaker has all the grain he needs. He wants some good linen, and he will not take grain for his bricks. What is the potter to do?

The potter has to find a linen-weaver who needs grain. He exchanges the farmer’s grain that he does not need for some linen that he does not need; then he exchanges the linen that he does not need for the bricks that he does need; and so the farmer, the potter, the brickmaker, and the linen-weaver all exchange what they have made for what they need.

### Gold Provided a Useful Means of Exchange

You can easily see that this kind of trading by exchange was a roundabout business.

After a time people in Egypt found an easier way. They used gold in their trading. Gold was something that people

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were always glad to receive in exchange for anything. This rare metal, found in the mountains, took up little room; it did not spoil, it could be hidden away easily. Besides, the jewelers were always wanting gold for the ornaments that they were making for the ruler, or Pharaoh, and the nobles of Egypt.

With gold to help in trading, some men now spent their lives in trading. These traders did not make things. They bought from those who wanted to sell. They sold to those who wanted to buy. In their buying and selling different things they used gold.

There was one trouble with gold. A dishonest trader might cheat. He might mix poor metal with good gold. To make sure that they were getting good gold, the traders had to weigh the gold and test it in every exchange they made.

The constant weighing and testing of the gold was a bother, but for a long time men could think of no better way. Then a king named Croesus, who ruled in a land near Egypt, had gold melted down and made into coins, which he stamped with his seal. Each coin weighed just so much and was just so pure. When a trader took a gold coin in trade, he did not have to weigh and test it. The king's seal was enough. From that day on, gold, silver, copper, and other metals have been made into coins that serve people in their buying and selling, in carrying on trade.

In the country gold and silver were scarce; so the trading still had often to be done through exchange. When the white people came to this country, they found some of

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the Indians using beads for coins. The beads were made of shells. For a long time the newcomers in our country had very few gold or silver or copper coins. In their trading they used wampum beads, as the Indians did, or they used tobacco and furs for money. Often they exchanged goods, very much as the Egyptian potter and the brickmaker exchanged goods. The farmer paid the furniture-maker with corn. If the furniture-maker received more corn than he needed; he exchanged some of his corn with a fisherman who caught more fish than he needed.

But here, as in Egypt, people found it hard to buy and sell without metal coins to help. So, when the people set up their own government, the United States of America, the government made gold, silver, and copper coins, and stamped them with the mark of the government.

Still, gold was scarce in this country until the year 1849, about the time of our great-grandfathers. At that time men found gold in the bed of a river in California. Others found gold near by. At once there was a great rush of people to the 'gold fields.' Later, gold was found in other parts of the West and in Alaska, too. Some of this gold was gathered up with the river soil and caught in a sieve held in running water. The water carried off the earth and left the heavy particles of gold. Today gold is obtained from the mountains by mining.

All this gold helped trade. With gold, men paid workers to build more of the new steamboats and railroads and factories. With gold, men paid for new tools that helped the



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factories make things more quickly. Many men put their gold together to form big trading companies. Some of these trading companies were soon carrying on trade with all parts of the United States. There are trading companies that carry on trade with all parts of the world.

To help in all the trade that is going on, there are banks where people can deposit their money. These banks lend some of the money to farmers, to factory-owners, and to merchants.

The farmers use the money they borrow to help them raise the crops they sell. Then they pay the money back to the banks.

Factory-owners use part of the money they borrow to help them buy raw material, and with the other part they pay wages to their workers. When they have sold their goods, they pay back to the bank what they have borrowed.

Merchants often borrow money from banks, so that they can buy goods from the farmers or from factory-owners. When the merchants have sold the goods, they pay off their bank loan.

People who deposit their money in business banks pay by check for the goods they buy. The check is a paper that tells how much money the depositor wants the bank to pay out. It also tells to whom the money is to be paid.

Today if we wish to travel anywhere in the world, we do not have to carry all our money with us. We can leave it in our bank at home. The bank arranges that we can get our money in any country we visit.

The banks also arrange for payments made by companies in our land to farmers, factory-owners, or merchants in other lands.

So today the whole world is like one huge market place in which men are buying and selling. By this buying and selling, the wares of all the lands are brought to our doors.

### Questions to Answer

1. How did people carry on trade in ancient times?
2. Who invented the first coin, or piece of money?
3. Why was this invention important?
4. Can you find out the meaning of the words "as rich as Croesus"?
5. What did the early colonists in this country sometimes use for money?
6. How is buying and selling carried on today?
7. What better way can be arranged for us than to carry money when we travel? How do we do this?
8. What is the difference between selling at wholesale and selling at retail?

### Things to Do

1. Let four pupils act out the exchange of wares between the farmer, the potter, the brickmaker, and the linen-weaver.
2. Make a collection of pictures showing different methods of trading.
3. Let members bring to the class coins and other kinds of money used in other countries than ours. See whether this money is stamped to show how much it is worth.

## *Chapter 26*

### **SENDING MESSAGES: THE SPOKEN WORD, THE WRITTEN WORD, THE PRINTED WORD**

It is evening. Mother is reading her newspaper. Father is reading a business letter. John is calling his sister to show her a picture in his book.

The words that John is speaking, the writing that father is reading, the printing that mother is reading, all are ways of carrying messages.

John's spoken words carry a message from his mind to the mind of his sister who hears them. The written words in the letter carry a message from the mind of the man who wrote them to the mind of John's father. The printed words in the newspaper carry a message to John's mother.

We need ways of sending messages, so that people can work together to get food, clothes, and shelter.

People need to talk to one another about their work. They must write to one another about business. They have to learn about the world from books, magazines, and newspapers.

Within the last hundred years, men have invented new ways of sending messages: the telegraph, the telephone, the cable, the wireless, radios, and motion pictures. In the next chapter we shall describe these new ways of sending



messages. In this chapter we shall read how the spoken word, the written word, the printed word, came to be.

### The Spoken Word

The story of the sending of messages begins when all the world was still a wilderness and people were first learning to put their thoughts into words. As people discovered the power of speech, those who lived in different countries invented names for the things around them. But people who lived in one valley would call a tree by a different name than those who lived in the next valley. In this way it happened that each land had its own language, and each language was like a code that could be understood only by those who had learned it.

The different languages that people invented have come down to us, with new words that have been added from time to time. Today people are still adding new words to the languages they speak.

Almost all the people in our country speak English. In England the people also speak English, but their way of speaking it is slightly different from our way. Even within our own country people in different parts of the land speak in somewhat different ways.

In most of the lands that lie south of the United States, people speak Spanish. Most of the people in Canada speak English, but in some parts of Canada people speak French. The English language was brought to this country and to Canada from England. The French language was brought

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to Canada from France. The Spanish language was brought from Spain to Mexico and to the many countries south of Mexico, although in Brazil, a South American country, the Portuguese language is spoken.

### Picture Language

For a long time after men used words, they did not know how to write them; but then some men who wanted to send messages drew pictures on wood or on animal skins, and these pictures carried their thoughts to others. Some Indians in this country still use picture language for writing, and can read a letter drawn with picture signs.

### The Written Word

In time the people in some countries learned to use an alphabet for writing. They invented a code of signs to stand for different sounds, like A, B, and C, and with these signs they spelled out words. So the art of writing was born. Any one who learned the signs of the alphabet had a code with which he could spell words and send letters in writing. Some men now wrote their messages with brushes on animal skins or on a paper made from the stalks of plants.

Sending messages by writing helped people. Before writing was invented, people could teach only by the spoken word, which might be poorly remembered or even forgotten. When people could write books about the things they did and about the things they learned, their books preserved

their thoughts exactly as they wrote them down. In this way knowledge was carried to all persons who could read.

For thousands of years books were written by hand, and all copies of books were made by hand. For this reason books were expensive. Few persons could afford to buy them. Few persons knew how to read.

### **The Printed Word**

About five hundred years ago, about the time when Columbus was born, some men learned how to make copies of books by printing them. They cut letters out of wood. They put these letters together to form words and sentences until they had a whole page. They used a printing press to print many copies of this page from the one page of wooden type. In this way they were able to print many hundreds of books in less time than it would have taken to write out one copy by hand. They printed their books on paper made from linen fiber. You will learn more about books in Chapter 30.

One thing that helps in the printing of our millions of books, magazines, and newspapers is the way in which paper is made today. Until a short time ago most paper was made by hand from rags. Today paper is made in paper mills from logs.

Near the paper mills there are great piles of logs that have been floated down from the forests. In the mills, machines grind these logs into small chips. Tons of these chips are poured into metal tanks, containing powerful acids.



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Trees, like many other plants, have fine fibers running through them. As the acids break up the woody fibers in the chips, the fibers change to a soft, wet mush, called *pulp*.

To see what pulp is like, we can tear a piece of paper into shreds, soak the shreds in water, then squeeze them into a small mass.

When the pulp has been made very fine by other machines in the mill, it enters the paper-making machines. It flows into this machine, mixed with water, one hundred parts of water to one part of pulp. As this liquid mixture flows along a sort of metal apron through which many holes are punched, the water drains off, and the wood fibers in the pulp join to form a long sheet of paper about six feet wide. As this sheet moves on, it is dried by heat. At the far end of the machine, the paper is wound up in rolls. There may be as much as five miles of paper to a roll.

We need this quick way of making paper for the printing presses of today, because our huge newspaper presses can print as many as one thousand newspapers a minute.

The men who set up the type for newspapers are helped by a machine called the *linotype* machine. As they type on this machine, metal letters fall into place. Each line of these metal letters is then pressed against liquid metal, where a mold of the line is made.

### Carrying Words by Mail

Before the day of the steamship and the railroad, letters, books, newspapers, and magazines could carry their messages

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only as fast as sailing ships, horses, or carriages drawn by horses could take them. In this country the government established the postal service, to send mail from one part of the country to another, but in the early days it took days for a letter or newspaper from New York to reach Boston. It took weeks for mail to be carried from New York to Chicago. It took months for mail to cross the continent. The cost was so great that little mail was sent.

Today trains running from the Atlantic coast of our country carry mail across the continent in four days. The cost of sending a letter this distance is two cents. With steamships to help, the United States mail carries letters halfway around the world for a few cents.

In our schools, boys and girls learn how to use spoken words. They learn how to spell and to write. They learn how to read. Being able to speak well, to write well, and to read well, not only will help them to do their share of the world's work, but also will help them to learn about the work done in all parts of the world.

### Things to Do

1. All the words in the list below have to do with communication. First, be very sure that you know what *communication* means; then tell in what way these words have to do with communication.

code	language	spelling	linotype
reading	letters	magazines	conversation
picture language	books	newspapers	writing
messages	pictures	paper pulp	cable

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2. Find how many different ways of communicating the boys and girls in your class have experienced.
  3. Make a collection of pictures for your bulletin board showing various kinds of communication.
  4. Draw a set of pictures telling the story of communication.
  5. Find, if you can, what some of the letters of our alphabet looked like in other much earlier alphabets.
  6. Find how much it costs to send a letter to various foreign countries. To send a letter by air mail in this country.



## *Chapter 27*

### **SENDING MESSAGES: TELEGRAPH, CABLE, TELEPHONE, WIRELESS, RADIO**

Howard, who lives in the country, is not helping his father today. Early this morning he went down the road to watch linemen fasten telegraph wires to wooden crossbars on a tall pole.

Howard's father has told him how the telegraph helps to bind the farms and villages, the towns and cities, in our broad land into one united nation.

It is less than one hundred years since a few men began to see that the people in our country who were living thousands of miles apart needed swift and sure ways of sending messages through space. These men began to experiment with new ways of sending messages, and it was out of their experiments that the telegraph, the telephone, and the cable were born.

#### **Old Methods of Signaling**

Long ago, people used columns of smoke from hilltop fires, or the beating of drums, as signals to friends who were far away. Some wilderness peoples still use these means of signaling. But for the million and one messages that the people in our country had to send, they needed the new inventions.

### Mr. Morse and the Telegraph

While still in college, an American, Samuel F. B. Morse, learned of the experiments which men were making with electricity. Later on, the idea flashed into his mind that the electric current passing through wires could be used to carry messages from a sending instrument to a receiving instrument. By pressing a button in the sending instrument, the electric current, passing through the wire, would make a mark or cause a click in the receiving instrument. He made up a code in which a short stroke would stand for a dot, and a longer stroke would stand for a dash. A dot and a dash would stand for A; a dash and three dots would be B, and so on all through the alphabet.

It was a hundred years ago that Mr. Morse first planned this new apparatus. People thought nothing of his idea. Many of them made fun of it. But finally, in the year 1844, with money voted by Congress, Mr. Morse built a line of wires from Washington to Baltimore. His plan was tested and proved successful. The first message to be carried in this way was "What hath God wrought."

This way of sending messages is called the *telegraph*, a word which means "to write far off." Today there are millions of miles of telegraph wires carrying messages over the lands of the earth. Before the telegraph, it often took weeks and even months for people in the eastern part of our country to know what had happened in the western part. The telegraph now carries messages almost within the minute. The telegraph

is one of the most important inventions that man has made. Some persons believe it comes next in importance to the discovery of fire and the invention of the steam engine.

### Mr. Field and the Ocean Cable

Telegraph wires, bound in heavy cables, also carry messages under the oceans. In the year 1866, through the work of Cyrus Field, the first successful cable was laid across the Atlantic. Mr. Field felt that we should have such a cable, and that it would work. He persuaded people to give money for laying it. Twice cables had been laid as he suggested, and twice they had failed because the cable broke and stopped the flow of electric current under the ocean. But the third time the cable worked. Farmers, merchants, bankers, government officers in this country were able to send messages to Europe and to receive them from Europe.

Today there are eight Atlantic cables from the United States to Europe. There are cables from the United States to Asia. There is a cable from the United States, down under the Atlantic, to South America. In South America this line continues from the Atlantic Ocean across the continent to the Pacific Ocean. To reach the Pacific, the wires had to be carried across the high Andes Mountains.

### Mr. Bell and the Telephone

The telegraph and the cable transmit messages by dots and dashes. Other inventors found ways of carrying the sound of the voice through space.



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In the year 1876 Alexander Graham Bell showed people in the city of Philadelphia an instrument by means of which people could speak over wires. It was the telephone. In the telegraph the electric current in wires carried the message in code, in a series of dots and dashes that stand for letters. The telephone wires carry the message of the voice itself.

Today in our country and in many other lands, people have telephones in their homes and in their offices. They use the telephone again and again throughout the day to speak to people in their own towns or in distant towns and cities.

Throughout each day millions of business messages are being sent in this way by means of the telephone.

### The Wireless and the Radio

Only a short while ago an Italian inventor, whose name is Marconi, found a way to send messages without the aid of wires. Men now flash wireless code messages across land and water. Wireless has been especially useful to ships at sea.

The latest invention for sending messages is the radio, which is a wireless way of carrying the voice through space. This is called *radio-telephony*.

### Something about Distances and Costs

Distance makes little difference in the time it takes for telephoning messages. The distance a voice travels between New York and London is about 3600 miles. From

San Francisco to Oslo, Norway, the voice passes one-third of the way around the world in less than a quarter of a second. A call between Mexico City and Madrid in Spain follows a path of more than 7700 miles.

The United States has telephone connections with 29 countries. Great Britain can talk with 37 countries and France with 36. The number is growing so rapidly that within a very short time these figures will be out of date.

You may like to know how much it costs to talk to some one across the Atlantic Ocean. When men first began to talk across the ocean by means of a telephone without wires, a call between London and New York cost \$75 for the first three minutes and \$25 for each additional minute. These rates have been steadily reduced until in May, 1930, the rates were \$30 for the first three minutes and \$10 for each additional minute.

Not only can persons talk between two cities, but it is possible for a person on board a moving steamer to talk with some one on shore. Conversations are carried on daily between passengers on the great ocean liners, the *Leviathan*, the *Majestic*, the *Olympic*, and their relatives and friends at home. Like all long-distance telephoning, the cost of these ship-to-shore conversations varies with distance.

There is also under way a project for a radio-telephone station on the Pacific coast near San Francisco, through which telephone service will reach to the Hawaiian Islands and westward to Australia and the countries of the Far East.

Many other countries of the world are extending their

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radio-telephone service thousands and thousands of miles from their homes.

### Things to Do

1. Find a short story of the life of each inventor mentioned in this chapter. Tell these stories to your class.

2. Copy these sentences and put in each blank the word or words that will make the statement correct.

(1) The telegraph is a method of sending a message over a wire by \_\_\_\_\_.

(2) The telegraph was invented by \_\_\_\_\_ in the year \_\_\_\_\_.

(3) Messages can be sent across the ocean by \_\_\_\_\_. The first \_\_\_\_\_ was laid across the \_\_\_\_\_, through the work of \_\_\_\_\_ in the year \_\_\_\_\_.

(4) The telephone is an instrument through which two persons can \_\_\_\_\_.

(5) \_\_\_\_\_ invented the first telephone in the year \_\_\_\_\_.

(6) The United States has telephone connections with \_\_\_\_\_ countries.

(7) Talking to some one across the ocean by telephone without wires is called \_\_\_\_\_.

(8) The distance a voice travels between New York and London is about \_\_\_\_\_ miles.

(9) It costs \_\_\_\_\_ to talk to a person in London for three minutes.

3. Add to the pictures you drew telling the story of communication after Chapter 26.





## PART VII

### *TOOLS THAT HELP IN THE WORLD'S WORK*

#### CHAPTER

28. How Man Uses Tools to Increase His Power
29. Copper, Iron, Steel, Coal, and Oil Make Modern  
Tools Possible
30. Books as Tools





## *Chapter 28*

### **HOW MAN USES TOOLS TO INCREASE HIS POWER**

When workers are busy putting up a steel building in the city, many people stop to watch them and the giant tools that they use. Here a great steel beam, weighing tons, is being lifted hundreds of feet. Two men are on the beam, but they have no fear. They know that the man at the engine has pulled the lever that started wheels going; those wheels are pulling a cable that runs around a pulley above them, down to the beam that they are riding. They know that the engine, the wheel, the pulley, and the cable have all been tested. They have faith in these tools that are helping them in their work.

Wherever we look, in our homes, on farms, on country roads, in city streets, in factories, stores, and offices, we see people using tools to help them.

In our story of the taming of the wilderness, we read about some of the ways in which tools help man. Without tools the wilderness people could never have defended themselves against fierce animals. Without tools men could never have turned the wilderness into towns and cities. Tools helped men by increasing their power many times over.

When the hunters found that their hands were not strong enough to kill their enemies, they made themselves wooden

clubs. Clubs gave a longer reach to men's arms. They gave more force to men's blows.

When men threw stones, the reach of their arms increased. When they used bows to throw arrows, the reach and force of their arms increased still more. Later they learned to use guns and cannon to hurl shot at their enemies. Today a cannon can hurl a cannon ball many miles.

Just as men made tools to do what their arms could not do in throwing, they made tools to do what their legs could not do in walking. They made tools to do what their backs could not do in carrying. They made tools to do what their hands could not do in plowing the earth, in gathering the harvest, in grinding grain, in sowing, in cutting down trees, in sawing trees into lumber, and in many other tasks.

Women also had tools, such as needles, that helped them in sewing. They had spindles and looms to do what their unaided hands could not do in spinning and weaving.

In the early days when men were hunters and herdsmen, they made their simple tools of wood, stone, or bone. Later men learned to make tools of copper, bronze, iron, and steel.

With metal, men made axes and saws to cut down the forests. With wood cut from the forests, men made wheels that helped them carry their goods; they made ships to be rowed by oars or driven by the wind.

We have read how ships brought people from Europe to America. The same ships also brought to America many of the tools that these people had been using in Europe.

With these tools to help them, the white people prospered in America. By the year 1776 the people in our country were strong enough to declare themselves free from the rule of a king in Europe. So the United States of America, a new nation, was born to take its place among the nations of the world.

In 1776 our nation was new, but most of the tools that men used at that time were old. They were like the hand tools that the men and women of Europe had been using for thousands of years.

### The Steam Engine

But about this very time the world suddenly made a great leap forward in the invention of tools. Many of the new tools were invented in America, but much of the progress in tool-making began in the year 1769, when James Watt in England invented a practical steam engine.

Before the time of the steam engine, people had found ways of using the power of animals, of fire, of wind, and of falling water to help them with their tools. The steam engine used the power of steam to help man in his work.

When the water in our teakettles is heated, it changes to steam. As the steam needs more room than water, it comes out through the spout. If we seal the spout, the steam will lift the lid. If both the spout and the lid could be tightly sealed, the steam would explode the kettle. Steam seeking escape from a closed chamber has much force. In the first successful steam engine, you may remember, the force of



the steam was used to work a pump that pumped water out of a coal mine.

Soon other men used steam engines to turn the wheels of the new spinning machines and the new looms. They used steam power to turn the paddle wheels or the propellers on ships. Steam engines turned the wheels of railroad locomotives and the wheels of sewing machines.

The city factories, working with steam engines, could make things more quickly than people working at home with hand tools; so more and more work was done in factories, and the cities grew.

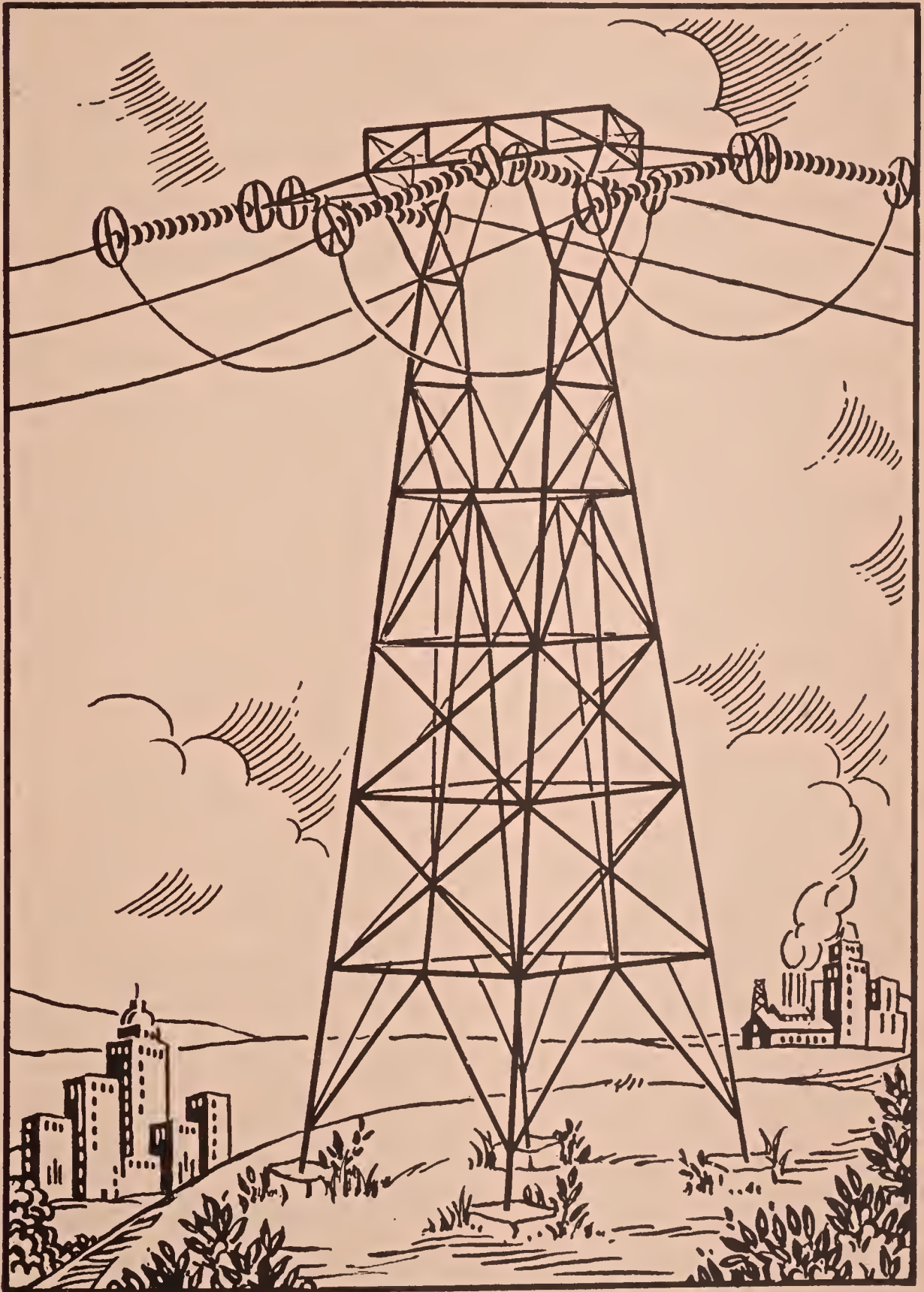
The railroads and the steamships could carry great cargoes. For this reason more and more men went into the distant wilderness to clear large farms for planting and for raising live stock. They were sure that they could ship their farm goods to the growing cities.

To feed the great number of people in the cities, the farmers on the large farms needed new tools. Soon men invented machine plows, harrows, drills, reapers, binders, and threshers. The farmers ran some of these machines with steam engines.

### How Electricity Increased Man's Power

While some men were making tools that could be worked by steam power, other men were learning to put a new force to work for them.

For a long time a few men had been experimenting with a strange force called *electricity*. Then one day Benjamin



Electric Power Can Be Led through Copper or Aluminum Wire to a City a Hundred Miles Away

Franklin, one of the Americans who helped the United States to become a free nation, helped the men who were studying electricity. He proved by an experiment that electricity and lightning are one. His experiment made inventors still more eager to learn how they could use this powerful force to work for men. The inventors learned how to make electric batteries. They learned how to use copper wire to carry electric currents. Other inventors, as we have seen, learned how to send messages through copper wires. Still others invented ways by which electric current can give us light and heat. They found ways of changing the force of falling water into electric power.

To make electric power from water power they built power houses near waterfalls. There is one such power house near Niagara Falls, in western New York State. In a power house the great mass of falling water turns huge wheels. As the wheels turn, they set other wheels turning inside a *dynamo*. This dynamo is made with magnets and with copper wires, arranged in such a way that the turning of the dynamo wheels charges the wires with electric power.

Water power, of course, is used near waterfalls. But the electric power made from water power is different. Electric power can be led through copper or aluminum wire to light a city a hundred miles away, or to turn the wheels of factories even farther away. At present men have found that it does not pay to carry electric current more than three hundred miles.



### Gasoline and Fuel-Oil Engines

After the discovery of electric power, men learned how to make gasoline motors. They found that they could make a small engine in which gasoline would spray into a chamber. Here a small electric spark between two wires would cause an explosion. The exploding gas seeks escape, just as the steam in the steam engine seeks escape. The force of the escaping gas is used to turn the wheels of the motor.

It was the gasoline engine that made possible the automobile, the tractor, the airplane. Today, some ships, trains, and factories use an oil called *fuel oil* for their engines. This fuel oil and gasoline are both made from the oil called *petroleum*.

### How the New Tools Have Changed Man's Way of Living

So we see that since 1767 the steam engine, electric power, the gasoline engine, and the fuel-oil engine were invented. During this same time men invented new factory machinery. They also invented new machinery for flour and lumber mills, new mining machinery, new printing presses. Most of these machines are run by steam or electric power.

With all the new tools and the engines that run them, man has added to his strength many times over.

The new tools worked by the new engines have changed people's ways of working, both on the farms and in the cities. They have also changed ways of living. The world in which we live today is so different from the world of Benjamin

Franklin's day that, if he could visit us, we should have to explain to him most of our tools and our ways of doing things. He would see a world in which the new tools worked by the new engines make it possible for many persons to enjoy comforts and luxuries that kings in Franklin's day did not even imagine to be possible.

### Something to Do

If you have read this chapter carefully, you will be able to copy these sentences, adding in each blank the word that will make the statement correct. If you cannot fill these blanks correctly, read the chapter again.

1. In ancient times the chief occupations of men were \_\_\_\_\_ and \_\_\_\_\_.
2. Their tools were made of \_\_\_\_\_, \_\_\_\_\_, or \_\_\_\_\_.
3. As man improved his ways of doing things, he made his tools of \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
4. Before the time of the steam engine, man used the power of \_\_\_\_\_, of \_\_\_\_\_, of \_\_\_\_\_, and of \_\_\_\_\_.
5. The first successful steam engine was invented by \_\_\_\_\_ in the year \_\_\_\_\_. He lived in \_\_\_\_\_.
6. An American later discovered, by flying a kite in a thunder storm, that \_\_\_\_\_ and \_\_\_\_\_ were the same sort of power. His name was \_\_\_\_\_.
7. Electric power is often made from \_\_\_\_\_ power.
8. Many changes in our ways of living have come about because man is an \_\_\_\_\_.

## Chapter 29

### COPPER, IRON, STEEL, COAL, AND OIL MAKE MODERN TOOLS POSSIBLE

The time, long, long ago, when people used stone for tools is called the *Stone Age*. This was followed by the *Copper Age*, when people used copper tools. The *Bronze Age* began when workers learned to make bronze by melting copper and tin together. When men learned to make tools of iron, the *Iron Age* began. The Iron Age lasted hundreds of years. Then, about seventy-five years ago, when men found a way of making steel in great quantities and at little cost, there came our own age, the *Age of Steel*.

Although steel is used for making so many of our tools, machines, and engines, we must not forget that copper, coal, and oil, and other minerals, too, are also playing their part in the giant machinery and swift-running engines of today.

How then do we get these materials? Copper, coal, and oil, and the iron from which steel is made, are all obtained from the earth. Copper, coal, and iron are obtained from mines in the earth. Oil is obtained from the earth.

#### The Copper Age and Modern Copper Mining

First let us consider copper. No one knows when or where copper was first used. It was probably found by accident.



Perhaps some Stone Age man found that a lump of this reddish metal made a better weapon than a stone. He found that, when he pounded a lump of it, it did not break as a stone would, but only flattened out. Then he began to hammer one side of it into a sharp edge and had a copper tool that he found very strong and lasting. Now, with better tools, he could do his work more easily. He began to mine the metal from open pits.

It was probably by accident, too, that men learned to use fire to smelt the pure copper from its ore. Perhaps some traveler found strange, glittering lumps in the ashes of his campfire. Instead of breaking when struck, these lumps were soft and dented. They had a reddish gleam. They could be hammered easily when cold.

After discovering that this metal would melt, men could see that the melted mass took the shape of the hollow in which it was found. This suggested an easier way to shape metal tools than by hammering.

Later men learned to mix tin with copper to make *bronze*, which was still stronger than copper. Much later they mixed copper and zinc to make *brass*. Brass has been known less than half as long as bronze.

From the copper articles that have been dug up and from a few records in writing and in pictures, we know that such ancient peoples as the Chinese, the Egyptians, and the Hindus used copper as early as several thousand years before the time of Christ. The Bible tells us of Tubal Cain, who taught people to work in copper.

The Egyptians probably used copper for beads and pins long before they made tools of it. There is still preserved a copper button found in an Egyptian tomb that dates back to 4400 B.C., or more than six thousand years.

One of the earliest tools of the Egyptians was a long copper saw with which the great blocks of stone for some of the pyramids were cut.

There were coppersmiths, or copper workers, in ancient Egypt who carried on a regular business and supplied orders. There are still to be seen crude pictures of their furnaces and bellows.

Copper pipes have been found in an Egyptian temple — a plumbing system thousands of years old! Copper pipes carried water to the king's palace. Not long ago a piece of copper pipe in good condition was dug up near the tomb of a king. It is estimated to be at least 5400 years old.

If you could have visited an ancient Egyptian market, you would have seen people using heavy copper rings instead of money. One important use of copper today is for coins. Every coin we use, even a gold piece, contains some copper to make it wear longer. The Egyptians grew very wealthy from their trade in metals. Most of their copper came from the peninsula of Sinai, which is at the northern end of the Red Sea.

There are records preserved that tell us that the ancient Chinese used copper. They mined coal to get fuel to smelt the copper. They worked also in bronze, for their tin and copper mines and their coal mines were near one another.

Their bronze vessels inlaid with gold and silver are beautiful.

When our country was discovered, the white men found the Indians using copper necklaces, bracelets of copper beads, copper spears and arrowheads, and copper knives. They found the mines from which the Indians had been taking copper. They found some of the Indian mining tools. In the open mines they even found huge lumps of copper that the Indians had not been able to take out.

One huge lump, weighing as much as four tons, the Indians had managed to move about two miles from the mine. There it stayed for years until, in 1843, it was moved to Washington and placed in the National Museum.

The copper region south of Lake Superior furnished most of the copper the Indians used. This region still furnishes large quantities of copper.

Wherever men find signs of large deposits of copper, they sink shafts and dig tunnels into the earth. When a miner goes to work, he enters a cage that lowers him rapidly through the shaft to his working level. Down the timbered shaft he goes, until he reaches the place he is to work, perhaps nearly a mile below the surface of the earth.

Once in the mine some men work to blast the rock. Others load the broken-up ore on ore cars. At the different levels small railways haul the cars to the shafts. The copper ore is then hoisted to the top and sent to be smelted. Much of this copper ore, as it comes out of the mine, is mixed with rock, soil, and other impurities. The ore has to be smelted to get out the copper.



Some of these mines are like great underground office buildings, with their many workers, many floors, their cages to carry men and freight, their telephone systems, their ventilating systems, their fire protection.

If the ore lies very near the surface or if there is a hill of copper, as sometimes happens, 'open mining' is used; that is, the ore is removed in the open by steam shovels, and cars running on short railroads. Around such mines have grown up small cities in which the principal industry is the smelting of copper.

After the ore is smelted down in furnaces, the hot liquid copper is cast into ingots, or bars, which are cooled. Many of these ingots are sent to factories where workers mix the copper with tin to make bronze and with zinc to make brass. Much copper is sent to the wire mills, where machines draw it out into the fine wire that is used to carry electric current.

Today, the world over, there are millions of miles of copper wire that help to transmit the electricity that carries messages, lights cities, and turns the wheels of electric motors.

Inside the lead-covered telephone cable that carries messages there may be as many as 1800 pairs of copper wires. Each copper wire is covered with a thin wrapping of paper to keep it from touching any other wire. Each pair of wires connects some telephone with the central exchange.

In our homes copper is serving us every hour in the day. Because of it, we can have electric washing machines,

vacuum cleaners, electric fans, and other appliances that make work easier and our lives more comfortable. Many homes are roofed with copper and screened with copper. The best hardware for the home, as door knobs and locks, is made of brass, which is largely copper. So is the best plumbing.

We can see that copper is a valuable servant of man in doing the work of the world. Imagine how difficult it would be to find something to take the place of copper if the supply of it should suddenly be used up. What would happen to transportation? How could people communicate with one another easily? What changes would have to be made in your homes?

Next to iron and steel, copper is the most useful metal today. However, aluminum is now rapidly finding new and valuable uses. Like copper, aluminum can be drawn out into wire and it has many special uses because it is so light in weight.

### **The Story of Iron and Steel**

In Chapter 22 you read something of the early history of iron.

Iron, like copper, is obtained from mines in the earth. Like copper ore, iron ore must be treated by fire. When the ore comes from the mine, ships and trains carry it to the iron mills or the steel mills.

Inside the iron mills, great metal cars, holding tons of iron ore, glide on pulleys along overhead cables to the blast

furnaces. Limestone and coke are added to the ore. Then blasts of hot air and gas are forced through the furnaces to smelt the ore. The white-hot liquid iron is then poured into large molds and allowed to cool. The cooled ingots, called *pig iron*, can afterward be worked into various kinds of things made of iron or they can be sent to the steel mills to be made into steel.

In the steel mills, the iron ingots are once again melted down in great pots, and other minerals are added to the molten iron. Then hot air is blown through this white-hot liquid mixture. Great flames, orange, blue, yellow, and purple, shoot out of the melting pot. The men watch the flames because the colors tell them when the impurities have been burned away. So liquid iron becomes liquid steel.

This liquid steel is poured into molds where it starts to cool, but while it is still very hot and soft, it is rolled into the steel beams and girders used in building tall houses. But this is only one of the uses of steel.

Steel is used in the building of bridges, which, swinging across rivers and over deep mountain gorges, help to carry trains on their way. Heavy steam locomotives are made of steel. Steel machinery made the clothes and tools that the train is carrying from the cities to the farms. Steel harvesters gathered the wheat that the trains are carrying to feed the cities. The ships that bring us sugar, fruits, spices, from the far ends of the earth are run by steel engines.

Steel! Steel! Steel! How many tasks steel tools and



engines with their tireless bodies and their tireless arms perform for us!

Many engines built of copper, iron, and steel, like electric locomotives, are run by electric power that has been made from water power; other machines and engines must have either coal or oil for fuel. The heat that is in these fuels helps to drive our steam engines, our oil engines, our gas engines.

### The Story of Coal

Coal is obtained from the earth by mining. The coal in the earth is really the remains of forests and ferns, buried ages ago. Through countless years the buried plants, packed tight by the weight above them, change to the hard black 'rock' that we call coal.

This same process is going on today in some of our swamps and peat bogs. Of course, the coal now being formed is made of the remains of different plants from those that made the coal we are burning. There are no fernlike trees in our country today, as there were when our coal was made. Perhaps the coal beds now being formed will show prints of our hardwood and evergreen trees.

In coal the heat that the plants of long ago gathered from the sun is stored in less space than in wood. A small pailful of coal will give more heat than a big log of wood. For this reason, since about one hundred years ago, people have been using coal rather than wood as a fuel to get heat for warming houses or cooking food or making steam to drive engines.

Coal, like the other minerals we have studied, has had a long and interesting history. Very early, man discovered that this black 'rock' would burn. Very old flint axes have been found buried in old coal mines in England. The Romans found the Britons burning 'black stones.' You have learned earlier in this chapter that the Chinese used coal to smelt their copper. They also used it to bake their porcelain.

There are records of grants of land for coal-digging in England as early as the thirteenth century. Coal was being sent to London by ship, and even then there were complaints about the smoke! For a time, the use of coal was forbidden in England. It was not until England had used up most of her forests, by burning charcoal made of wood, that coal began to be burned in large quantities.

As early as 1679, soft coal was reported by Father Hennepin when he was exploring in what is now Illinois. Later, *anthracite*, or hard coal, was discovered. Most persons believed at first that this coal was too hard to burn, and some of it was actually broken up and used for roads. It was a long time before people came to realize its value. When the people who were running railroads and steamboats found how much better coal was than wood, and when ways were found to carry the coal where it was wanted, then the coal industry began to grow.

In our country there are great deposits of hard coal in mines in the eastern part of the state of Pennsylvania. There are deposits of soft coal in many parts of the country.

Where coal is found in mountains, tunnels are dug side-

ways into the mountain walls. More often, the miners must sink shafts down into the earth. Then at different levels, they dig horizontal tunnels that are like underground roads branching off from the shafts. Heavy beams keep the tunnels from caving in.

In some mines there are miles of these underground tunnels. To reach them, men enter a cage at the top of the shaft. A cable lowers the cage to the level on which the men work. They get out into the dark tunnel.

To light their way, they have lamps attached to their caps. This leaves their arms free to work. When the men reach the mass of coal they are to mine, they drill holes into the rock. They place a cartridge in each of these holes. By means of fuses, they explode the cartridges, thus breaking loose coal and rock.

Helpers load the loosened coal into cars. Pushed by hand, drawn by mules or by engines, the cars carry their loads to shafts through which the coal is sent up out of the mine.

Some coal is removed by steam shovel and open mining, just as copper is. Open mining is not so hard or so dangerous as underground mining and requires fewer men.

When the coal has been separated from rock and stone and sorted according to size, it is ready to be sent to factories, mills, and homes.

More coal is transported by rail than in any other way. Most of the coal for New England, except near the ocean, comes by rail. On the Great Lakes, coal is sent in big cargo



steamers. On the Ohio River, it is shipped by barge or flatboat.

Since the greatest amount of coal is shipped north to our great manufacturing cities, it is important that it be shipped before winter sets in. For during the winter months many rivers are frozen, so that boats cannot travel on them. Besides, it is during the winter that coal is needed most to warm our houses.

There are different kinds of coal, depending on the kind of plants composing it, the length of time it has been forming, and the amount of pressure it has had.

*Lignite*, sometimes called 'brown coal,' is the nearest to peat. It is like wood and breaks up easily. It will not furnish so much heat as other coals do.

*Bituminous* coal, or soft coal, so valuable in manufacturing, has been longer in forming and has had greater pressure than the brown coal. It furnishes great heat, but burns with a great deal of smoke unless the fire is carefully tended. It takes more than a ton of soft coal to smelt a ton of iron ore and more than four tons to produce one ton of steel.

The hardest coal is the *anthracite* of the eastern states. It is the best coal for heat in the home, because it is clean and burns well with little or no smoke.

Besides the coal that is burned in furnaces and boilers to heat houses and other buildings, a great deal of coal is used in large cities to make gas. This gas is stored in huge tanks and then carried by underground pipes to furnish gas light, and especially to burn in gas stoves.

It often happens in industries that when a factory is built to make a certain product, it turns out that other products, called 'by-products,' can also be made at the same time. Sometimes the making of these by-products becomes even more important than the making of the first product. An example of this is found when coal is heated to make gas. From the gas itself can be secured, before it leaves the gas plant, another substance, *ammonia*. Ammonia has many uses, from the making of artificial ice to making fertilizer.

Then, from what remains of the coal after heating, *coke* is secured. Coke is sold by the gas companies to people who burn it in their furnaces like coal.

From the gas plant is also secured a sticky black substance called *coal tar*. Many wonderful and curious things are manufactured from this coal tar. It is difficult to believe how many different things can be made from it, such as benzol used in some automobile fuels, and also useful medicines, perfumes, and beautiful dyes to color our cotton, linen, silk, and wool. So many and so valuable are the uses that experts, called chemists, have found for this by-product of the gas plant that a whole industry, called the *coal-tar industry*, has been created.

You can see, then, how very interesting and how very important are these uses of coal in connection with the making of gas. Still, the most important use of coal is its direct use as a fuel for changing water to steam and so driving the thousands of steam engines working for us day and night.

### The Story of Oil

Coal gives our engines power. Oil furnishes not only power, but also the needed material to prevent friction in all sorts of engines and machinery.

The gasoline that drives our swift automobiles and airplanes, the fuel oil that runs many engines, the lubricating oil that makes the wheels of engines turn more easily, all come from petroleum.

Petroleum means 'rock oil.' This oil, formed from plants and animals that lived on the earth ages ago, is found stored up in porous rock, like water in a sponge.

Petroleum has been known to man for thousands of years. Long ago people in different lands saw pools of a sticky substance that burned when it was thrown upon a fire. This was oil that had oozed up from its rocky underground home.

Ancient writers mention the use of oil for medicine. This seems to have been its first use. Marco Polo, a famous traveler of long ago, reported that a hundred ships could be filled at a time with oil from the lake at Baku, that it was not good to eat, but that it was good to burn and to cure the sore backs of camels.

The Chinese drilled oil wells before the time of Christ. The Greeks used oil to frighten their enemies, for it could burn on water. The Egyptians used it for pitch and mortar and also in preparing mummies. They regarded the places where oil was found as holy. There is an account of the oil springs of Sicily where petroleum was used in lamps.



One of the first Greek historians, Herodotus, has left an account of how he had seen oil obtained. It was swabbed up from the lake with a branch of myrtle. A pole was let down into the water, with a bunch of myrtle tied to one end.

In our country there were places where the Indians saw oil floating on the surface of creeks or rivers. This, too, had oozed from the earth up into the streams. When the white people came to this country, they used some of this oil as a medicine. They believed it would cure many illnesses; they even believed it would cure baldness.

The settlers collected petroleum from the surface of the water with woolen cloths in much the same way that Herodotus tells about.

Sometimes oil was regarded as a nuisance. When drilling for salt, the settlers often got oil with it. This spoiled their salt.

One of the places where people found oil floating on water was Oil Creek in Pennsylvania; and it was near this place that a man named Colonel Drake, digging into the earth, struck America's first oil well about sixty feet down. As this oil sold for forty dollars a barrel, hundreds of other men began drilling wells for miles and miles around Drake's well. Many of these men struck oil, and from that day to this some of the wells in Pennsylvania are still pumping up oil. Since that time oil has been found in many other parts of the United States.

Once people learned ways by which they could get petro-

leum easily, they looked for new ways in which petroleum could be used. Before long they found marvelous uses for it.

Petroleum is not used as it comes from the earth. It is first purified in refineries. In the refineries, petroleum is heated in huge kettles, called *stills*. As the oil becomes hot, it gives off gases. At one temperature it gives off one gas. At higher temperatures it gives off other gases. Pipes leading from the stills carry these gases to cool tanks, called *condensers*. Here the cold changes the gases to liquids. In one condenser the gas obtained by heating the petroleum changes to gasoline. But in the oil refineries petroleum by-products include not only gasoline but also kerosene, lubricating oils, fuel oils, both light and heavy, and also some kinds of asphalt.

Kerosene oil proved a great boon in the days when there was no gas and no electric light for the home. The kerosene lamp seemed a marvelous invention to people who had had to do all their work at night by the light of candles.

As a fuel, gasoline made possible our modern automobiles and the airplane. Before the fuel value of this product of petroleum was known, gasoline was regarded as a waste product; only kerosene was considered valuable.

The lubricating oil is used to grease engines so as to reduce friction between moving parts. Without lubricating oil, our machines and engines could not run nearly so fast. In fact, the friction would soon wear out the parts; the heat from the friction would ruin the engine.

Now people are using fuel oil, very much as coal is used, to make steam for engines on railroads, on steamships, and in factories. Fuel oil can be sent for long distances more easily than coal. It is easier to load a ship with fuel oil. It is easier to feed oil to a boiler than to feed coal to it.

With these uses for kerosene, gasoline, lubricating oil, and fuel oil, people have been wanting more petroleum and more petroleum and still more petroleum.

For many years men have been searching all over the United States and all through the rest of the world for signs of oil fields. These men have found great oil fields in many parts of this country outside of Pennsylvania. California, Oklahoma, Texas, all help to give us much of our oil. Mexico has great oil fields. So has Russia. Still the search goes on.

Where the signs seem to be right, men drill into the earth. They begin by building a huge derrick. From this derrick they hang their drill, which may weigh a ton. An engine works the drill, which works its way down through rock and soil a hundred feet, a thousand feet, sometimes two thousand feet, and even more.

Drilling an oil well is very costly. The people who have risked their money to pay for the drilling wait for word. Will the drillers 'strike oil' or not? Often they do not. The earth below is dry, and all the money spent in drilling is then lost. On the other hand, drillers sometimes strike such a good well that the oil comes gushing up through the pipe and spouts away up into the air, a stream of black, flowing oil that brings gold to the men who own it.



Today much oil is carried through *pipe lines* to huge tanks where it is stored. These pipe lines are laid under the earth.

From the storage tanks other pipe lines carry the oil for hundreds or even thousands of miles to the oil refineries. These great pipe lines can transport large amounts of oil more cheaply than it can be carried by rail.

Oil is also carried by tank cars, by tank ships, and by motor trucks. Tank ships move great volumes of oil from the Texas oil fields to the eastern refineries.

California is noted for the size and number of its oil wells. Many of the wells are over a mile deep.

In this country alone, billions of gallons of petroleum are used each year, and billions of gallons will be used in each year to come. No wonder the great nations of the world are all eager to make sure that their people will not lack oil for a long time in the future.

Our modern world, you see, would be impossible without the minerals we have been studying about in this chapter.

### Things to Do

1. Make a list of all the useful metals mentioned in this chapter.

2. After you have made a list of the metals, make a list of the things that are made from each of them.

3. Make a list of the other minerals mentioned in this chapter.

4. Now list the uses we make of these minerals.

5. Coal has a very interesting story. Tell it to your class or write it in your notebook. Some of the things you will want

to tell in your story are how it is formed, where it is found, how many kinds there are, how it is mined, and what it is used for.

6. Write a story describing the work of a coal-miner.

7. On an outline map of the United States, mark out the coal regions.

8. Be sure you know the meaning of the word *by-product*; then find what the chapter tells about the by-products of coal.

9. Tell what these by-products of coal are used for.

10. Make a list of metals seen in your classroom.

11. Find out, if you can, where the petroleum was secured from which was made the gasoline you see being sold where you live.

## *Chapter 30*

### **BOOKS AS TOOLS**

When you think of tools, you probably think of hammers, saws, hatchets, knives, and many other things you use with your hands to help you do some kind of work.

You hardly think of books as tools. But books are tools, because they help you in finding out so many things that you need to know. And the more you know, the better you are able to think. If you had no books, you could know almost nothing about the important things that have happened in the past. You could not know so much as you do about other places and peoples. You would have no interesting stories to read when you want to sit quietly in your homes. You could not enjoy reading about people and events in far-away places.

#### **Tablets, Papyrus, Parchment, and Paper**

The story of books is an interesting one. Long before printing was invented or paper was made, men kept records of events on clay tablets. The clay tablets of Babylonia and Assyria were collected into libraries and might be called ancient books.

As long ago as 2500 years before Christ, which was later than these ancient tablets, the Egyptians preserved their



sacred records on a papyrus roll. This roll had eighteen columns of picture writing and is still preserved in the museum called the *Louvre*, in Paris, France.

As long as papyrus was in use, books were made in the form of *scrolls*, or rolls wound around a stick. The writing was arranged in narrow columns across the scroll, very much like the columns of a newspaper today, except that there was still no printing.

Papyrus was made of the stem of a plant, pressed into a flat piece of fiber. This was hard to secure and some other kind of material had to be found. An ancient king, living about two hundred years before Christ, began to study ways of improving the skins of sheep and calves for writing purposes. These skins were called *parchments* and were in use for eight hundred years.

In the tenth century before Christ men began to make a writing material from a pulp of linen rags. This began in China. Many centuries after the Chinese discovered a way of making paper, paper mills were set up in Europe and the use of paper began to spread.

The invention of printing, which you will read about in a moment, led to an increase in the making of linen paper. When printing became common, paper was made from wood pulp. Pulp paper is much cheaper than linen paper, but does not last so long.

## The Early, Hand-Made Books Were Beautiful but Costly

Books were originally sacred writings or records of sacred events and so belonged to the churches. For a long time men continued to write and copy books on scrolls, but there came a time when men made books with flat leaves like those in this book.

Books became very elaborate and beautiful. Some of them were bound in gold and set with precious stones, and often they had beautiful illustrations drawn by hand that made them lovely picture books.

During the Middle Ages the learned men copied the writings of men who had lived centuries before them. These books were written by hand. Naturally, they were very expensive, because it took a long time to make even one of them. No one except the very rich and learned people could afford to buy them. The poorer people never even saw them.

Since there were few books, no one except the learned class knew how to read.

## The Printed Book

Then came the printed book, which opened the art of reading and book learning to the people. The craft, called *letter-printing*, which was done on wooden blocks, was also discovered by the Chinese. They were the first printers as well as the first paper-makers. The oldest known printed

book was found in China. It has this statement written upon it, "Printed on May 11, 868, by Wong Chilk for free distribution, in order in deep reverence to perpetuate the memory of his parents." You see in those ancient days books were dedicated to some honored person, just as we sometimes dedicate them today.

Printing from movable type was first done by Pi Shing in China in the years 1041 to 1049.

No one knows surely just when or where in Europe printing from movable type began. It is supposed it happened about 1440, but there are many different stories told about this invention. Germany, Holland, France, and Italy each began printing from movable type about that time.

It is believed that Holland was the first. In Haarlem, in Holland, a man named Coster was printing from movable type before 1446. But Johann Gutenberg was printing at Mainz in Germany about the same time, and he is often named as the inventor of printing. There were printers in Italy in 1465, and a man named Caxton set up his press in England in 1477.

The pages of the earliest books were printed to look like the hand-copied manuscripts, for the printers did not want their invention discovered. The Bible was among the first books to be printed. There were three hundred copies made during those early times; only forty of them are known to be in existence now. The others must have been lost or destroyed.



### What Printing Means to Us

Through the centuries many improvements in methods of printing by machinery have been made.

Today newspapers are printed so quickly that people all over the world can have daily newspapers to read. And many publishers of newspapers print both a morning and an evening paper. Frequently when some important event takes place, extra editions of newspapers are printed. You have heard the newsboys selling these extras in the streets of your own town or city.

So it is with magazines and books. Nowadays there are so many magazines printed every month, and so many books published, that no one could possibly read them all. It is far different from conditions a few centuries ago when few persons knew how to read and there was almost nothing to read. Now there is much to read, and almost all persons in civilized countries can read. And those who love to read have to decide what of all this reading material they will read.

You see what the invention of printing has done for us. Until books were printed, not only did very few persons know how to read, but there were not even any schools for the children of the poor. There were no schoolbooks, no magazines, and no newspapers. It was not easy for man to preserve the knowledge of the past so that all could learn from it, as we can today. There was no quick way for news to spread so that all might know about things that were happening in other places.

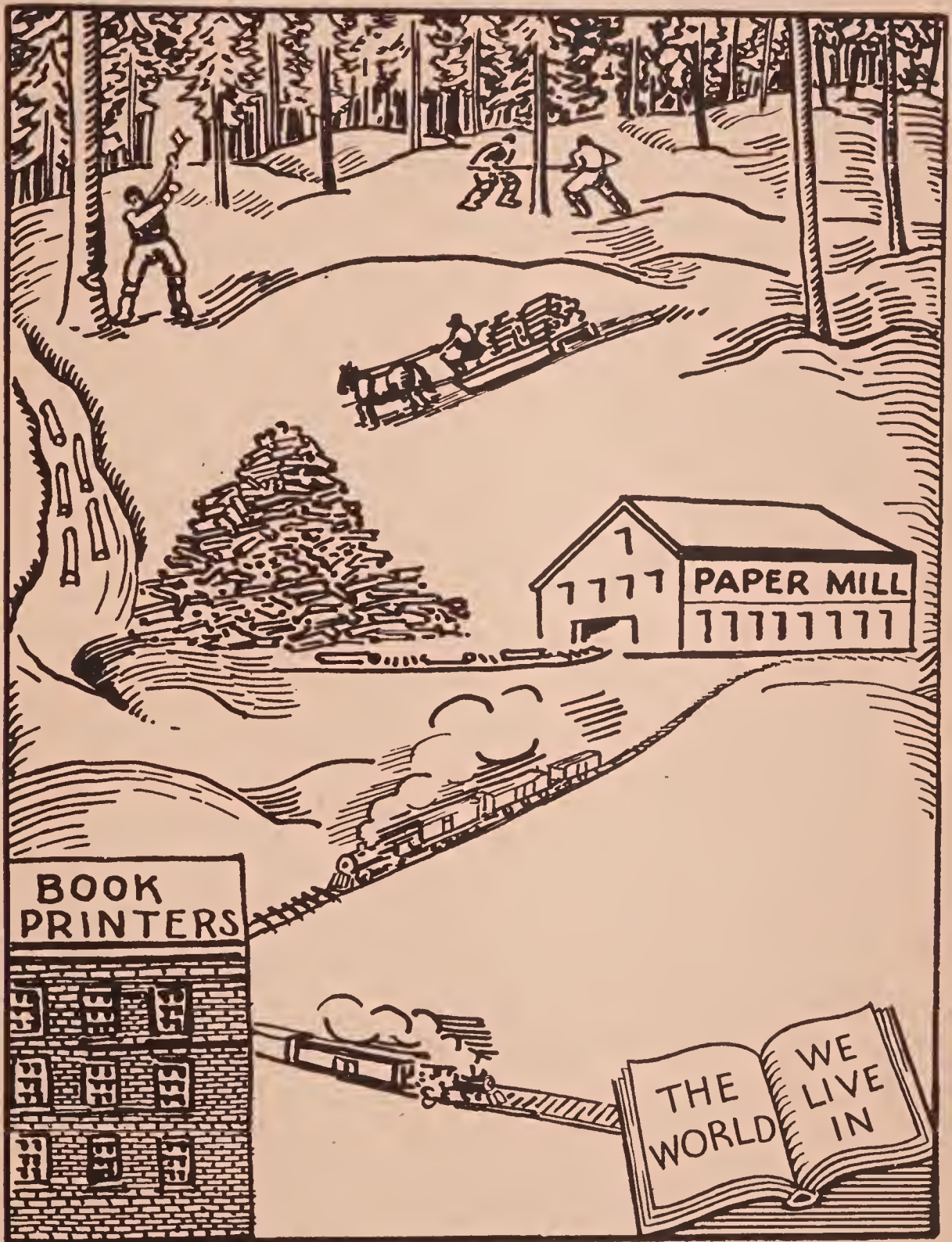
Books help us in many ways. We read them when we want to be entertained in our leisure hours. We go to them when we want to learn something that we cannot find out as easily in any other way.

### Things to Do

1. If you have read the chapter carefully, you can copy these sentences and put in each blank the word needed to make the statement correct.

- (1). Very early records were made on \_\_\_\_\_ of \_\_\_\_\_.
- (2). The Egyptians wrote on a roll of \_\_\_\_\_.
- (3). Printing on wooden blocks was invented by the \_\_\_\_\_.
- (4). The oldest known printed book was found in \_\_\_\_\_.
- (5). Until books were printed, few persons \_\_\_\_\_  
\_\_\_\_\_.

2. Make a list of all the ways books are a help to you.
3. Make a list of the books you have enjoyed reading.
4. If you live near an art museum and there is a collection of old books there, your class might arrange to go to see them.





*A Final Word from the Authors to the Children Who Have  
Read The World We Live In*

Now we have come to the end of our book about the world we live in.

In our study of this book we have journeyed a long way together over the face of the globe.

We have flown around the world with the airmen, looking down with them upon oceans, continents, islands, hills, mountains, plains, and river valleys.

We have learned with the wrecked fliers that men's immediate needs in their life upon this earth are food, clothes, and shelter. We have found out that people in all parts of the world are working to satisfy these needs of ours.

We have seen that the earth, with its animal, plant, and mineral departments, is the storehouse from which workers obtain the materials to meet these needs of food, clothes, and shelter. We have seen also that the earth, itself, is a workshop in which the forces of heat, wind, and water are at work.

In our study of this book we have also traveled in our thoughts over long periods of time. Our reading led us back into the past, back to a time when the whole world was a wilderness in which men and women, working with simple hand tools, had to get the things they needed directly from the wilderness.

Next we saw something of the history of man's life on earth after those early wilderness days. We saw how men and women conquered the wilderness, first in one part of the world, then in another; how they changed the wilderness into farms,

villages, towns, cities, and nations. We learned that today the work that people do is so divided that many of the things we use for food, clothes, and shelter now come to us from distant farms and cities, even from far-away lands. Thus it has come about that none of us can see with our own eyes how workers the world over are now making the things we, ourselves, need and use every day.

We were led thus to look in on these workers to see how they do their work today, how they have invented tools, how they have harnessed the forces in nature's workshop, how they have learned new and better ways to feed us, to clothe us, and to shelter us. We saw how men learned new ways of transportation and communication that have helped to bring all the peoples of the world closer together. We saw how trade in the goods of the earth has also helped to bind the nations more closely together.

In the course of our study we learned something of the geography of the earth, something of the history of man's life on earth, something about civics, or man's ways of living and working together peacefully in larger and larger groups.

We hope that your study of this book has helped you to a better understanding of the earth that is your home. You will be the workers of tomorrow. We end our book with the wish that every one of you may enjoy your share of useful work and happy play in the world we live in.

THE AUTHORS

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